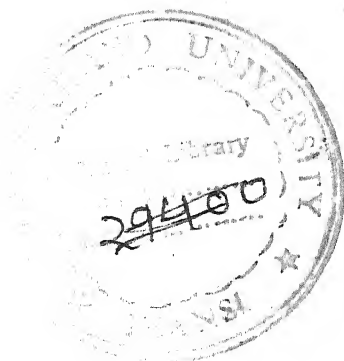


# **LIPOPROTEIN CHANGES IN HIGH RISK PREGNANCIES AND THEIR PUERPERIUM**

## **THESIS FOR DOCTOR OF MEDICINE ( INTERNAL MEDICINE )**



**BUNDELKHAND UNIVERSITY  
JHANSI (U.P.)**

1998



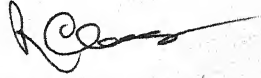
**Rakesh Kumar Srivastava**

### CERTIFICATE

This is to certify that the work entitled "LIPOPROTEIN CHANGES IN HIGH RISK PREGNANCIES AND THEIR PUERPERIUM" has been carried out by **Dr. RAKESH KUMAR SRIVASTAVA** in the Department of Medicine, M.L.B Medical College Jhansi.

He has put in the necessary stay in the department as per university regulations .

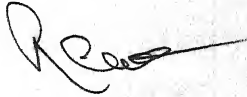
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### CERTIFICATE

This is to certify that the work entitled "LIPOPROTEIN CHANGES IN HIGH RISK PREGNANCIES AND THEIR PUERPERIUM" which is being submitted as a thesis for M.D (Medicine) Examination, 1998, Bundelkhand University, has been carried out by Dr. RAKESH KUMAR SRIVASTAVA Under my direct supervision and guidance. The techniques embodied in this thesis were undertaken by the candidate himself and the observations recorded were checked and verified by me from time to time.

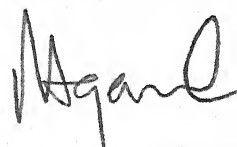
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## ACKNOWLEDGEMENT

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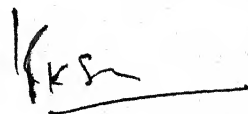
I am also greatly indebted to **Dr.P.K.Jain M.D,MNAMS and Dr.Praveen Kumar Jain M.D,DM(Cardiology), Associate Prof.s ,Dept. of Medicine** for giving me inspiration and encouragement .

I express my heartiest thanks for the cooperation extended at every step of my work by my friends especially Dr Abdul Majeed, Dr. Arun Yadav, Dr Adesh Srivastava, Dr M.S. Yadav, Dr Rahul, Dr. Arun Shrama, Dr. Talreja, Dr. Munish, and Dr. Saurabh.

No amount of words can express the feeling of gratitude to my parents and my brothers for their moral support, love and affection and constant encouragement during my work on this study.

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In the last I would like to give full credit to, and I am thankful to Mr. Ashish Gupta, Mr. Anil Haridasan and his staff members of AISECT for their pain taking efforts in preparing such a neat print of the present work.



DATED: 19/6/98

{Rakesh Kumar Srivastava}

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# *INTRODUCTION*

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## INTRODUCTION

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Various studies have been done about the hormonal changes brought about by pregnancy but still pregnancy is a metabolic curiosity. However it brings significant changes in metabolic process. It is known that high concentration of many of the sex steroids occur as normal pregnancy advances and since cholesterol is the precursor of most of these steroids, part played by lipid metabolism in pregnancy becomes more and more intriguing.

It has been observed that increase in serum total cholesterol and serum triglycerides occur steadily till term and then falls abruptly after delivery (Boyd, 1934; Dieckmann & Wegner, 1934; Waston 1957). This was also corroborated by studies previously done in our department (Arora and Indu, 1985, Arora and Vinita, 1986). This denotes that placenta is the principal organ responsible for the elevated serum total cholesterol (STC) and serum Triglyceride (STG) during pregnancy. The incidence of atherosclerosis is less in Indian women even in repeated pregnancies, where the cholesterol level is elevated. This is probably because the elevated Oestrogen might be preventing the deposition of cholesterol in the intima of arteries and veins (Chaturvedi et al, 1978). These metabolic changes are rather exaggerated in Toxaemia of pregnancy (a syndrome complex characterised by hypertension to the extent of 140 mm hg or more with oedema or proteinuria or both induced by pregnancy usually after 20<sup>th</sup> week of gestation). The toxaemia of pregnancy is an inadequate term which is still frequently used to cover a condition peculiar to pregnancy whose aetiology is unknown but was formerly attributed to the action of a hypothetical toxin since it is no longer believed that this disorder is caused by toxin, a better term is pre-eclampsia and is accompanied by fetal and maternal hypercholesterolaemia (Indu Bala, 1983, Lall and Sinha, 1983). Ghosh reported that the value of total cholesterol rises significantly in pre-eclamptic patients. Brat Vold and De Avez (1961) noted some increase in serum total cholesterol in pre-eclampsia as compared with values in normal pregnancy. The difference however was not thought to be significant. On the contrary Arsoba and Kretowicz (1963) reported that such difference was statistically significant. The serum cholesterol level falls gradually in the post partum period both in toxaemia and in normal pregnancy. However in toxaemia cases such levels do not return to normal as quickly as it does in the cases of normal pregnancy. (Lall and Sinha).

Cholesterol is necessary for cell division so it is important for synthesis of structural component of foetus and elevation of all lipid plasma carrier during pregnancy correlates well with the increase in

the fetal caloric demand . Triglycerides and fatty acids are directly transported from the mother to foetus in early pregnancy but probably are synthesized in foetus later in pregnancy . cholesterol is capable of direct transfer from mother to the foetus. Placental production of progesterone can be estimated which is important for maintenance of pregnancy and also as the precursor for placental progesterone biosynthesis is maternal low density lipoprotein (LDL) cholesterol (Simpson & associates ; 1954 , Hellig & associates 1970 ; Casey , 1992) so by estimating maternal LDL .

The implantation of the conceptus , the support of embryonic development and continuation of pregnancy depends on a complex interaction and hormonal effects on hypothalamic , pituitary uterine ovarian axis . Among the sex hormones important are oestrogen , progesterone , human placental lactogen and human chorionic Gonadotrophin . During normal pregnancy plasma progesterone increases to about 25 ngm/ml 9 weeks after ovulation and remain relatively constant until about 10 weeks of gestation when placental secretions taken over . Plasma level of progesterone rises rapidly from 28<sup>th</sup> week onwards and reaches to approximately 180 nmg/ml with the level being relatively constant during the last 4-6 weeks of gestation . Similarly oestrogen concentration also increases till term (Kloppler and Billiwicz , 1963 ; Beisher et al , 1969) urinary oestrial level also rises progressively during pregnancy from 5.5 g mg / 24 hr at 20 weeks to about 33 mg / 24 hrs at term and if the level is less than 12 mg /24 hrs. during later months , it suggests serious foetal compromise in utero . It has also been shown from various studies that in 50% cases showing sustained low level of oestrogen there is evidence of growth retardation .and also as the precursor for placental progesterone is maternal LDL .c (Simpson & Associates,1954,Hellig & Associates 1970,Casey 1992) So by estimating maternal LDL placental production of progesterone can be estimated which is important for maintenance of pregnancy Intra uterine growth and it's aberrations are major concern of modern obstetrics because birth weight is the strongest indicator of perinatal mortality.

The birth weight depends upon both the gestational age and foetal growth . Although perinatal mortality is an outcome variable that is both clinically relevant and readily ascertainable , the morbidity associated with intra uterine growth retardation (IUGR) is also significant (Koops and associates , 1982).

The term intra uterine growth retardation is designated to indicate the fetus with birth weight less than 10<sup>th</sup> percentile or below 2 standard deviation of the mean for that period of gestational age . There are many factors associated with intra uterine growth retardation . Apart from fetal causes like chromosomal

abnormalities , congenital malformations , fetal infections and placental abnormalities , maternal causes are also very important . Among various maternal causes , important are maternal vascular diseases like pregnancy induced hypertension , chronic hypertension and advanced diabetes Mellitus , nutrition besides environment & Haematological causes.

Although studies have been done on lipid lipoproteins profile in female of various age groups and their relationship with different hormones , little attention has been given to its relationship with pregnancies complicated by toxemia and intrauterine growth retardation

Before studying the changes in lipoprotein profile it is necessary to have some background knowledge about lipoprotein . Lipoproteins are of mainly five types - High density lipoprotein (HDL) , Low density lipoprotein (LDL) , very low density lipoprotein (VLDL) , serum triglycerides (STG) and total serum cholesterol (STC) . Lipids remain in plasma in complex form other than chylomicrons . Triglyceride transport is the major recognised function of serum lipoproteins . VLDL tells the function rate of hepatic triglyceride synthesis which in turn depends upon :-

- Rate of free fatty acid uptake from blood
- Fatty acid synthesis from glucose
- Extent of fatty acid oxidation
- Conversion of fatty acid to triglycerides.

VLDL transports triglycerides to muscle and other tissue as a source of energy . Ingestion of glucose decreases VLDL whereas increased level of VLDL has been related with obesity , high carbohydrate or low fat diet , ingestion of food in need and diminished level of HDL and LDL.

LDL is mainly derived from breakdown of VLDL in the circulation . LDL is increased by fat saturated fatty acids and cholesterol . function is uncertain.

HDL is synthesized in the liver . HDL lipid serve as major substrate for lecithin cholesterol acyl transferase . HDL also function to transport cholesterol from peripheral tissues to the liver

. So with all these informations we decided to study the changes in lipoprotein profile in pregnancies complicated by PIH( pre-eclampsia and eclampsia ) and IUGR during their antepartum, intrapartum and postpartum period in a group of females from Bundelkhand region.



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# *AIMS & OBJECTIVES*

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## AIMS AND OBJECTIVES

- To know the trend of changes in various lipoprotein fractions during ante partum period that is I and III trimesters of pregnancies complicated by toxemia , eclampsia and intra uterine growth retardation (IUGR).
- To know the changes in lipoprotein profile brought about by labour in toxemia , eclampsia and IUGR.
- To ascertain the trend of changes in levels of lipoproteins fraction brought about by immediate , early and late puerperium i.e. 24 hrs of post partum , 7 days post partum and 1 month post partum in pre-eclampsia , eclampsia and IUGR.
- To ascertain the effect of parity over the levels and trend of changes in various lipoproteins fractions in the pre-eclampsia & eclampsia.
- To compare the changes in various lipoprotein fractions in pre-eclampsia , eclampsia with good foetal outcome and bad foetal outcome.
- To compare changes in lipoprotein profile in pre-eclampsia eclampsia and intra uterine growth retardation during their antepartum , intra partum and post partum period.

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*REVIEW OF LITERATURE*

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## REVIEW OF LITERATURE

### LIPID PROFILE DURING NORMAL PREGNANCY

It has been known for years that an increase in circulating lipids occurs during pregnancy . Even though cholesterol and other lipids have been the centre of considerable lay interest and also the subject of much scientific investigations relatively few reports have dealt with serial studies of lipids during pregnancy.

Based upon virtually no information , Becquerel and Rodier<sup>1</sup> . In 1845 suggested that hyperlipaemia occurred during pregnancy . They hypothesized that this change represented an increase in blood cholesterol as well as increase in lipid phosphorous during pregnancy. Two years later Vershow<sup>2</sup> (1847) showed that the milky appearance of sera of some pregnant women was due to the presence of fat . The first clinical study was undertaken by Chauffard and Associates<sup>3</sup> . In 1911 who demonstrated an increase in blood cholesterol during pregnancy . In the same year Neumann & Herrmann<sup>4</sup> studied the lipid particle in the whole blood and reported increase in cholesterol during pregnancy.

The development of micro methods made it possible to study blood lipids partitions accurately . It was not until 1934 when Boyd<sup>5</sup> showed that the principle cause for the widely divergent results reported before that time was found to be the fact that some investigators were reporting determination performed on whole blood while other reports were based upon investigations of plasma and serum specimen Dickmann's<sup>6</sup> 1934 report dealt only with plasma cholesterol . Boyd found that almost no change occurred in lipid content of RBG during pregnancy , however striking changes were noted in the plasma lipids.

Different investigators have reported increased serum cholesterol level at different periods of gestation . Herrmann & Neumann (1972) analysed the serum of pregnant women and concluded that during first 6-7- months , serum cholesterol might be increased and that during the last two months an increase was the rule . Plass & Temkins<sup>7</sup> (1923) also have given rising figures of cholesterol during pregnancy from 4th month till term . Tyler & Underhill<sup>8</sup> 1929 determined that cholesterol and cholesterol ester increases gradually till term.

Gardner and Gainsborough<sup>9,10</sup> (1929) reported that free cholesterol increases during pregnancy to the 30<sup>th</sup> week with a decrease in ester cholesterol to about the same time Bugnard<sup>11</sup>, Columbus and Gwilheim. Hinglais and Covert (1940) found an increase in total cholesterol in later months of pregnancy.

Dickmann & Wagner<sup>12</sup> (1934) found the total cholesterol to increase to 23% above the first trimester level, which decreases to 27% at eighth post-partum week from the values noted at term. This rise noted by Dickmann is considerably lower than De-Alvarez<sup>13</sup> et al (1959) findings of 54% increase in third trimester for total cholesterol and a 23% decrease in the values 6-7 weeks post partum for total cholesterol and as compared to the 3<sup>rd</sup> trimester values. Oliver and Boyd<sup>14</sup> (1955) after careful study of 12 normal primigravida stated that between 31<sup>st</sup> and 33<sup>rd</sup> week of pregnancy, there was a highly significant rise in plasma ester and total cholesterol. By the 20<sup>th</sup> week post partum these values decreased considerably but were all higher than the level at 12<sup>th</sup> week of pregnancy.

Mc. Eachern and Gilmour determined whole blood cholesterol in 12 pregnant women and concluded that marked elevation was found in about 30% of normal pregnant women beginning about 6th week prior to delivery and that about 80% had a level above normal on the first day after delivery. the figures were still higher on the 12th post partum day. Later on this increase in total serum cholesterol during pregnancy was also proved by Mullick and Bagga<sup>15</sup> (1964), Konttinen<sup>16</sup> et al (1964), Maria R. Waith et al (1975), Kalkhoff<sup>17</sup> (1978), Darmandy<sup>18</sup> et al 1982.

Salamesh and Mastrogianis (1994) observed that plasma lipid lipoprotein undergo both qualitative and quantitative changes during pregnancy there is a gradual two to three fold increase in triglyceride level and they reach their peak 1200 mg/dl to 3000 mg / dl. At term & gradually falls thereafter by 36 week of gestation, VLDL and other lipoprotein particles increase their triglyceride content proportionately to each other and to increase in serum triglyceride total cholesterol level at term, changes less dramatically with only a 50-6 changes in plasma lipid and lipoproteins during pregnancy are thought to be adaptive. The rise in plasma triglyceride provide maternal fuel saving the glucose for factor. The rise in 2 DL-C appears to be necessary for placental steroidogenesis. Hypocholesterolemia caused by hypo betalipoprotein leads to decrease levels of estrogen and progesterone in affected pregnant women.

## Hormones in pregnancy and their role in maintenance of pregnancy

1. Oestrogen - oestrial is the main pregnancy oestrogen which accounts for 80-90% of oestrogen formed in late pregnancy.

in classic experiment Ryan<sup>19</sup> (1959) found that there is an exceptionally high capacity of placenta to convert certain C19 - steroids to oestrogen . The first proof that placenta uses plasma borne precursors as substrates for oestrogen biosynthesis shown by Baulieu and Bray (1963); Siiteri and Mac Donald<sup>20</sup> (1963)

### Effects of oestrogen on lipid profile

Eilbert (1949) found that oestrogen administration to women evoked an increase in the plasma total lipids . Russ and Associates<sup>21</sup> (1955) found that the administration of estrogen lowered the beta lipoproteins but raised the alpha lipoprotein Devi & Sharma<sup>22</sup> (1972) , Gupta (1976) . Wallace<sup>23</sup> et al (1979) observed that total cholesterol LDL and VLDL all have been elevated in women using oral contraceptives.

As the hormones like oestrogen and progesterone are important for continuation of pregnancy . It has been shown that outcome can be predicted by the subsequent rise in pregnanediol output as pregnancy progressed (Machanghten and Michie , 1960).

In other study by Klopper & Billiwitz (1963) they have estimated oestrial excretion in successful pregnancy and habitual abortion and shown that oestrial output in successful pregnancy approximates closely to normal values which that of abortion fall week by week until 10 weeks it was less than 40% of normal<sup>24</sup>

### Progesterone -

After the first weeks of gestation very little of progesterone produced arises in the ovary (Diczfatury and Troen<sup>25</sup> , 1961) . Daily production rate of progesterone in late normal singleton pregnancy is about 250 mg (Pearlman<sup>26</sup> , 1957) . Progesterone levels in maternal peripheral plasma increases progressively with gestation.

Workers (1957) , Simpson and Colleagues (1954) found that perfusion of placenta in vitro with radiolabelled cholesterol resulted in formation of radiolabelled progesterone<sup>27</sup>.

Hellig and associates (1970) also found that maternal plasma cholesterol was the principal precursor (upto 90% ) of progesterone biosynthesis in human pregnancy<sup>28</sup>

Simpson and associates demonstrated that trophoblast preferentially uses low density lipoprotein cholesterol for progesterone biosynthesis. This subject was reviewed recently by Casey and Colleagues<sup>29</sup> (1992)

#### Effect of progesterone on lipid profile -

Corredor et al (1970) found significant rise in triglyceride levels after 6-12 months use of oral pills. Barton in 1970 found significant rise in serum triglyceride levels in females using combined pills but there was no change seen with progestin only pills<sup>30</sup>.

Spellacy (1976) observed the effect of norgestrel on carbohydrate and lipid metabolism there was no significant change in serum cholesterol levels.

Lauritzen in 1977 observed a decreasing effect of norethisterone on cholesterol and triglyceride levels of beta lipoprotein<sup>31</sup>. He also suggested that there is no influence of hydroxy progesterone on cholesterol level. Bradley et al (1978) found that progestins derived from 17 alpha hydroxy progesterone and others are relatively inert, while those derived from 19. Nor testosterone (levonorgestrel, norethisterone acetate and others) decreases high density lipoproteins.

Krauss et al (1983) observed effects of two different progesterone pills and found that VLDL increased with only norgestrel. LDL was significantly lower in norethisterone group results were variable with very low density lipoproteins.

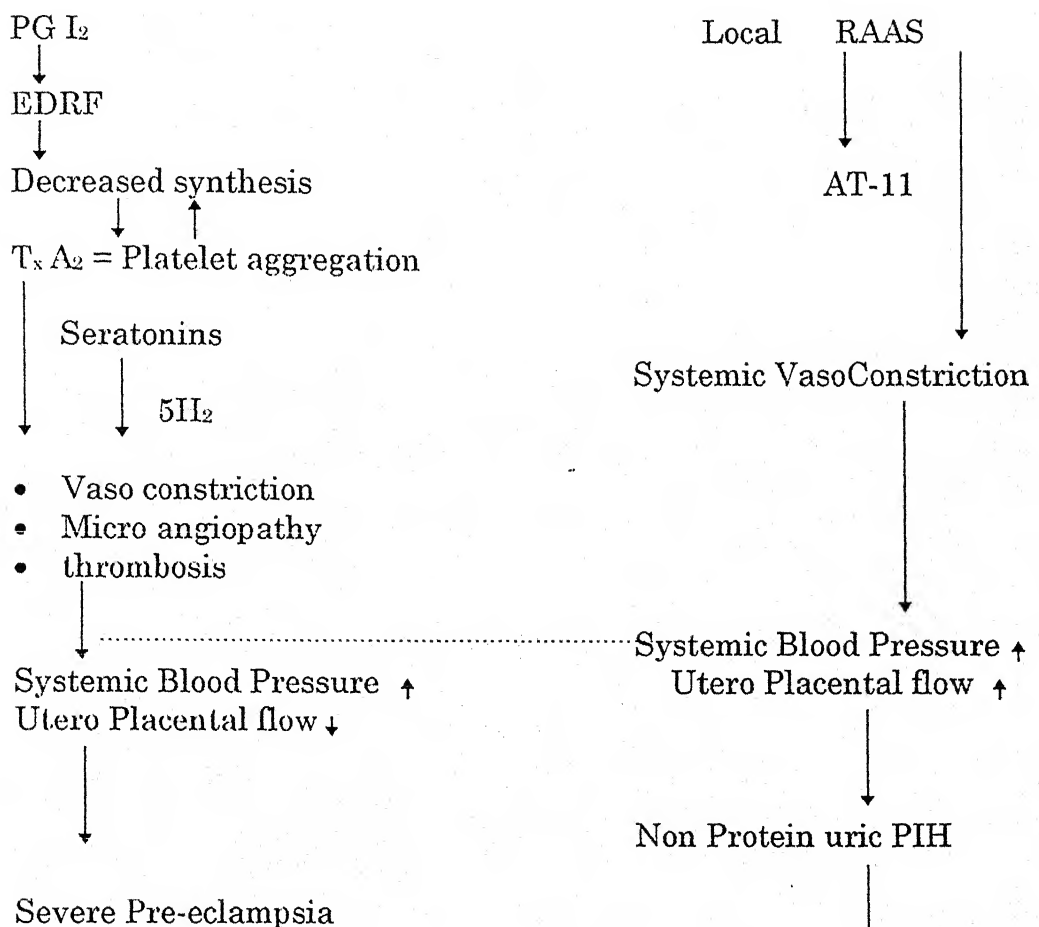
#### Lipoprotein in Toxaemic Mothers :-

The serum total cholesterol estimation was undertaken in 1911 by Chaffard and Associates<sup>32</sup> in three eclampsia patients and normal pregnant women. They reported an increase in the blood cholesterol during pregnancy but found no consistent variation in eclampsia mothers as compared to that of the conc. in the serum of healthy. Gravidac a similar conclusion was made by several other investigators (Aunyenreith & Runk; 1913, Burgert Prener; 1913; Schlimpert and Huffman, 1913; Huffmann 1955; Slemon's & Curtier, 1917 and Dickmann & Wegnar<sup>33</sup> 1934)

Boyd in 1935<sup>34</sup> reported plasma lipid in eclamptic mother. He observed mean value of total lipid to be  $829 \pm 255$  mg/dl. In eclampsia and  $785 \pm 117$  mg/dl in normal pregnancy. the mean cholesterol level was observed to be  $187 \pm 56$  mg/dl and  $179 \pm 35$  mg/dl respectively

## The pathogenesis of pre-eclampsia :

Endothelial dysfunction -



**Patho physiological mechanism**

**in mild and severe Pre-eclampsia** 5 HT = 5 Hydroxy tryptamine

(Zeenam and Dekke , 1992)

AT 11 = Angiotensin-II  
PG I = Prostaglan din I<sub>2</sub>  
EDRF = Endothelium derived  
relaxing factor

T<sub>x</sub> A<sub>2</sub> = Thromboxque A<sub>2</sub>

RAAS = Renin angiotensin  
aldosterone system



Neutral fat value were  $219 \pm 210$  mg /dl and  $248 \pm 63$  mg /dl , phospholipids were  $361 \pm 102$  mg /dl and  $293 \pm 52$  mg / dl in eclampsia and normal subjects relatively . However the ratio of phospholipid and cholesterol was found to be significantly higher in eclamptic patients than in other toxic or normal pregnancy.

Calvin et al (1939) found the initial cholesterol value of Toxaemic mother at third month to be 21 mg / dl which gradually rise in a fluctuating manner to 233 mg / dl in the 7th month then dropped sharply to 194 mg /dl in 8th month and 176 mg /dl in 9th month . During the time of pregnancy the basic metabolism was rising sharply in Toxaemic subjects .

Langer Crantz (1945) , Macy (1951) and Dickmann (1952) observed an increase in both serum protein and serum lipid in Toxaemia . Smith et al (1959) observed that cholesterol and lipid phosphorous increase as pregnancy progresses reaching their maximum at term. The percentage of lipoprotein showed a decline with progress of pregnancy specially during 3rd trimester.

De Alverz and Bratvold<sup>35</sup> (1961) studied total lipid in 7 normal pregnant women . the average mean value for total lipid during the last four weeks of normal pregnancy was  $974 \pm 154$  mg / dl . The mean value for mild pre-eclampsia was significantly elevated [ p.002] above the average value for normal pregnant women in third trimester . The women of severe Toxaemia were having total lipids almost 200 mg / dl above the mean level of normal pregnant level .

Arsoba and Kretowicz (1963) reported elevation in serum cholesterol , phospholipids and total lipid toxemia of pregnancy.

Nelson<sup>36</sup> et al (1966) observed triglyceride content of placenta . In toxemia simply reflect that placenta is disease organ in toxemia and found raised level of both maternal & Foetal Phospholipids and triglycerides as compared with controls . However the elevation was not statistically significant.

Mullick & Bagga (1964) found a gradual increase in Beta- lipo - proteins and alpha lipoproteins ratio as pregnancy advances . Bhattacharya<sup>37</sup> et al (1969) concluded after their extensive study over normal & abnormal pregnancy that although cholesterol levels were slightly higher in toxemia group , the cholesterol metabolism seemed to be similar in normal toxemia of pregnancy.

In 1978 Chaturvedi , Tandon and Singh<sup>38</sup> observed that in toxemia of pregnancy there was significant rise in total serum cholesterol as compared to the IIIrd trimester of normal pregnancy .

They also observed that in toxæmia serum cholesterol level did not return to same level as it did in the normal; pregnancy in post partum period and this was statistically significant. The level cholesterol had no significant relationship with the degree of hypertension in ante partum period. Mullick & Bugga<sup>39</sup> (1964) found a gradual increase in beta lipoproteins and beta and alpha lipoprotein ratio increases as pregnancy advances.

Warren<sup>40</sup> et al 1962 observed greatest increase in triglyceride followed by phospholipids and finally cholesterol in a pregnant female.

Pregnancy is associated with significant increase in VLDL and LDL conc. HDL<sub>2</sub> generally shows a slight decrease whereas HDL<sub>3</sub> is markedly increased leading to a significant increase in total HDL. Studies of Oliver and Boyd<sup>41</sup> showed that beta/alpha ratio is even greater than the uncomplicated pregnancy. Increased HDL<sub>3</sub> and decreased HDL<sub>2</sub> are still demonstrable 6-9 months post partum and the beta / alpha ratio remains 4 : 1 five months post partum period (HDL<sub>2</sub> - Chol. page 325) Worth, Arky & Knopp. In 1975 reported a consistent increase in LDL:HDL lipoprotein ratios quantitatively greater increase in beta than in alpha function. They stated that triglyceride rises more than cholesterol and phospholipids and HDL cholesterol is not significantly reduced.

Pontis<sup>42</sup> et al (1978) observed diminished percentage concentration of alpha lipoprotein with a concomitant elevation of percentage of beta lipoprotein at the first stage of labour and in Puerperium alterations towards normal non pregnant levels.

Ronald K. Kalkhoff (1978) stated that the hyper triglyceridemia of late pregnancy is mainly due to increase in VLDL concentration, constituents are proportional; and cholesterol, triglyceride and phospholipids are unchanged. Hyper triglyceridemia also due to increase in HDL and LDL in which triglyceride is reliably more. They also stated that Oestrogen is principle hormonal factor responsible for increased synthesis and release of endogenous triglyceride.

Knopp<sup>43</sup> et al (1981) stated that progressive hypertriglyceridemia of pregnancy is due to rise in VLDL triglyceride of particular interest was their finding of biphasic pattern in HDL cholesterol conc. with a peak in midgestation and then a subsequent decline towards non pregnant levels at term.

Dermandy<sup>44</sup> et al (1982) concluded that the primary changes in lipoprotein metabolism during pregnancy appears to be concerned with VLDL they observed pronounced elevation of VLDL conc. In

ultra centrifugal analysis of serum from pregnant women in 3rd trimester , compared with that from non pregnant women. After delivery the elevated serum triglyceride conc. decreases rapidly and the significantly greater utilization of serum triglyceide in lactating women could be caused by the tissue specified direction of VLDL towards the mammary glands for milk synthesis.

### **Lipoprotein in IUGR (Intrauterine growth retardation)**

In 1961 Warkany and co-workers<sup>45</sup> reported normal values for infant weights lengths & head circumferences and defined fetal growth retardation . In 1962 , WHO introduced the term low birth weight for all babies weighing less than 2.5 kg as a single category.

Gruenwald<sup>46</sup> (1963) reported that approximately one third of low birth weight infants were mature and their small size could be explained by chronic fetal distress probably due to placental insufficiency.

In 1963 Lubchenco & co-workers<sup>47</sup> from Denner published detailed comparison of gestational age to birth weights in an effort to derive norms for expected fetal size and therefore , growth at a given gestational week.

Battaglia and Zubchenco (1967) then classified small for gestational age (SGA) infants as those weighing below 10th percentile for their gestational age.

Kramer<sup>48</sup> (1987) reviewed 895 studies on fetal growth in english and french languages published between 1970 and 1984 and concluded that there was great confusion and controversy despite the profuse no. of studies . Problems with growth retarded fetuses - Wennergren and co-workers (1988) the neonatal performance of 160 infants defined to be growth retarded because their birth weight was a t or two standard deviation from the mean . In most cases 831 growth retardation has been suspected antenatally by birth weight less than 2 standard deviation of the mean for that period of gestation . hypoglycemia & Hypothermia occured frequently . The major hazard of growth retardation were still birth and fetal distress . Similar observations have been made by Villar & Colleagues (1990)<sup>49</sup> for growth retardation at term and by Vesser & associates (1986) between 25 and 34 weeks.

Autopsy findings in small for gestational age (SGA) infants have revealed two basic pattern of impaired fetal growth (Gruenwald , 1963 , Naye and Kelly, 966) one was designated as symmetrical growth retardation because all body organs tend sto be

proportionately reduced in size and assymetrical when some body organs are more affected than others.

Factors regulating fetal growth are mainly genetic and racial . Neonates of Indian and Chinese weigh less than those of Europeans of Africans (Ashcroft and Desai<sup>50</sup> , 1976) . Foetal growth is also influenced by the maternal weight , height , age , parity and duration of gestation . Social deprivation influences height & shorter women are not optimal reproduce as far as support of fetal growth is concerned (Gruenwald , 1968) .

Maternal & placental causes are also important . Hypertension during pregnancy causes IUGR . It varies with mean arterial pressure at 4-6 months higher it is lower the birth weight (Page and Christiansons( 1976).

Boyd & Scott<sup>51</sup> (1958) showed that compared to normal placenta in pre-eclampsia and IUGR were of a lower volume of Parenchyma and Villous surface with increased area of infarction.

Poor maternal nutritional status also affects fetal growth . Pregnancy weight of 40 kg or below , poor weight gain in pregnancy (less than six kg) , anaemia (Hb less than 8 gm / dl ) and mid arm circumference less than 20 cms ) were associated with low birth weight babies (Jayam et al , 1984) . Acute starvation restricts fetal growth with birth weight of 300-400 gm due to loss of body fat (Hyttén , 1979) with nutritional supplements ( Calories , protein , Iron < Folic acid ) in the 2nd half of pregnancy there is fetal weight gain of over 200 gm , compared with controls . (Venkatachalam , 1962 , Iyengar & Rajalakshmi , 1974 ; Lachting et al , 1975)<sup>52,53</sup>

Biale<sup>54</sup> (1983) studied lipolytic activity in the placenta of chronically deprived fetuses , concluded that lipoprotein lipase activity was significantly greater in placentas of pre-eclamptic women and in placenta of intra uterine growth retarded fetuses.

Iwaszkiewicz , Pawlowska<sup>55</sup> (1986) found that pregnancy complicated by intra uterine growth retardation , the free fatty acids concentration in amniotic fluid was almost three times higher than in normal pregnancy.

In 1980 Economide & Crook<sup>56</sup> showed that small for gestational age fetuses had hyper triglyceridemia and hypo glycemia and hypoinsulinemia.

Recently Berg , Ronald , Sande<sup>57</sup> (1994) found that high lipoprotein (9) [ Lp (9) ] level in maternal serum can interfere with placental circulation and causes fetal growth retardation.

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# *MATERIAL & METHODS*

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## MATERIAL & METHOD

The present study was carried out in the Department of Medicine and department of obstetrics and gynaecology, MLB, Medical college Jhansi, over a period of one year starting from March 97 to March 98.

### SELECTION OF CASES :-

The study comprised of patients attending outdoor clinic of the department of obstetrics and Gynaecology for Ante natal examination, Antenatal wards, Eclampsia room and from labour room directly. The pts studied were broadly divided into following groups :-

Group A - Pre eclamptic toxemia group

Group B - Eclampsia group

Group C - Pts with Intra uterine growth retardation (IUGR Group)

### PRE - ECLAMPTIC PATIENTS

Were taken to be those who developed hypertension after 20<sup>th</sup> week of gestation with the following associated conditions .

- a) Proteinuria and or
- b) Oedema or
- c) Both a & b

### HYPERTENSION -

An absolute rise in B.P. of at least 140 / 90 mm Hg, if the previous B.P. is not known or a rise in systolic pressure of at least 30 mm Hg or a rise in diastolic pressure of at least 15 mm Hg over the previously known B.P. is being considered as criteria for Toxaemic hypertension . The B.P. cited must manifest on atleast two occasions 6 hrs. or more apart.

### PROTEINURIA :-

It is defined as more than 0.3 gm/lit in 24 hrs. collection or greater than 1 gm/lit in at least two random urine specimens collected 6 hrs or more apart.



### OEDEMA :-

Demonstration of pitting Oedema over the ankles after 12 hrs bed rest or rapid gain in weight more than 5 pounds a month in later month.

Eclamptic pts. were taken to be those who developed convulsions and / or coma , not caused by any coincidental neurologic disease such as epilepsy and fulfilled all the conditions set fourth for pre- eclamptic patients as taken above.

### PATIENTS WITH INTRA UTERINE GROWTH RETARDATION :-

(IUGR Group)  $\Rightarrow$  This group included pregnant woman who had on clinical evaluation the fundal height of uterus being less by at least four weeks from the expected period of Gestation (on the basis of LMP) and later confirmed by ultra sonography.

Total no. of cases studied were 50 , 13 cases did not return at different stages of follow - up so 13 cases were excluded from the study , so total number of cases were 37 , out of which 10 cases were of pre eclampsia ,

17 cases were of eclampsia and 10 cases were of (I.U.G.R.).

### CLINICAL EXAMINATION :-

Acomplete clinical history of the above cases regarding age , parity , socio-economic status , literacy level , history of present pregnancy , past history , obstetrical history , menstrual history , family history , dietary history was taken as described in format . It was ensured that pt did not suffer from any other disease which caused increased cholestrol level such as coronary heart disease , renal disease , liver disease and diabetes mellitus. Complete general and systemic examination was done with special emphasis on - general built , pallor , height and weight , blood pressure and to rule out other disease which can cause altered lipid profile. The pts. were examined and investigated in detail to detect Toxaemia of pregnancy . Most of the pts. in eclampia group were in the last trimeter of pregnancy nearing term . Fundal height was assessed and the period of Gestation was determined and it was ascertained if this corresponds to period of amenorrhoea as told by the pt. Per vaginal examination was done specially in pts. having labour pains to ascertain whether she was in labour or not , so that blood sample could be taken at appropriate time. Patients who were diagnosed as having pre eclampsia or I.U.G.R. in II<sup>nd</sup> trimester were called again for regular follow up in the subsequent trimester of pregnancy to ensure best possible out come of those pregnancies.

Investigations:

Following investigations were performed.

I. Routine :- Haemoglobin , TLC , DLC , ESR , GB.P.

Blood group

Blood sugar

Blood urea

Blood urea , S. Creatinine , S. uricacid , liver function tests were specially done in cases of pre eclampsia and eclampsia.

Urine :- ( albumin ) Protein (quantitative by Esbach method )

Sugar

Microscopic

II. Lipoprotein profile :-

Serum total cholestrol

Low density lipoprotein

Very low density lipoprotein

High density lipoprotein

Serum triglyceride.

III. For I.U.G.R. Group specially

V D R L

T O R C H infection

Ultra sonography

Period of collection of blood samples :-

1. Antenatal period
  - a) One sample from 13<sup>th</sup> to 28<sup>th</sup> week (In pre eclampsia IUGR Group)
  - b) One sample from 28<sup>th</sup> week to 40<sup>th</sup> week.
2. During labour
3. Within 24 hrs. of parturition
4. After one week of delivery
5. At 30<sup>th</sup> day after delivery



## METHOD OF COLLECTION OF BLOOD SAMPLES :-

- 5 ml of blood was withdrawn from the patients having fasted for 12-14 hrs. (wherever it was possible) without any venous stasis in recumbent posture with full aseptic precaution.
- After withdrawing the sample, it was allowed to settle, facilitating the serum to separate, then centrifuged and serum was preserved with standard precautions.

## ESTIMATION OF LIPID FACTORS :-

Various lipid factors - Serum Total Cholesterol (STC), Serum triglyceride (STG), High density lipoprotein (HDL) were estimated with standard diagnostic kits while low density lipoprotein (LDL) and very low density lipoprotein (VLDL) were derived from values of above mentioned lipids by formulae.

- 1) Serum Total Cholesterol :- STC was estimated by Wyenbenga and Pileggi (1970) method utilising commercial kit supplied by ETHNOR. The basic principle is that Chalerlerel reacts with test solution of ferric Perchlorate, ethyl acetate and sulphuric acid and gives a lavender coloured complex which is measured calorimetrically.
- 2) Serum Triglyceride (STG) :- It was estimated by acetyl acetone method. Principle behind is that Triglycerides are determined by measuring glycerol after its liberation from fatty acid by saponification. Glycerol is oxidised by sodium meta periodate to formaldehyde which is directly proportional to the amount of triglycerides.
- 3) High density lipoprotein :- HDL was estimated by commercial kits supplied by ETHNOR. Basic principle is that the HDL cholesterol fraction is separated by using a precipitating reagent. The precipitate contains chylomicrons, VLDL, LDL which are removed by centrifugation. The supernatant contains HDL cholesterol which is estimated by HDL-C color reagent which gives purple coloured complex which is measured calorimetrically at 560 nm (560 - 600 nm). The intensity of color developed is proportional to the concentration of HDL-C in the specimen under test.
- 4) Very low density lipoprotein :- It was calculated by formula given by Friedwald et al (1972). This formula is valid upto STG values less than 400 mg %.
- 5) Low density lipoprotein :- It was calculated by formula given by Fredrickson D.A. (1972)
 
$$\text{LDL (mg / dl)} = \text{STC} - (\text{STG}/5 + \text{HDL})$$

or

$$\text{LDL (mg / dl)} = \text{STC} - (\text{VLDL} + \text{HDL})$$

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*OBSERVATIONS*

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## Statistical Analysis

"t" Value was calculated by -

1. For comparison in the same group -

$$t = \frac{\bar{d}}{S(\bar{d}) / \sqrt{n}} \quad S(d) = \sqrt{\frac{1}{n} \left[ \sum d^2 - n\bar{d}^2 \right]}$$

Degree of freedom (D.F.) = n - 1

2. For comparison in different groups -

$$f = \frac{\bar{X}_1 - \bar{X}_2}{S \sqrt{1/n_1 + 1/n_2}} \quad S = \frac{(n_1 - 1)SD_1 + (n_2 - 1)SD_2}{n_1 + n_2 - 2}$$

Degree of freedom (D.F.)  $n_1 + n_2 - 2$

$p > .05$  not significant  
 $p < .05$  Significant  
 $p < .01 \text{ \& } < .001$  Highly Significant

While comparing two groups only those cases who had representation in both groups, were considered for statistical Analysis.

**TABLE II**

**serum lipoprotein profile in cases of preeclampsia during antepartum, intrapartum and post partum period.**

	II trimester	III trimester	IP period	24 hrs PP	7th day PP	30th day PP
STC mg % mean $\pm$ SD	178.33 $\pm$ 21	196.77 $\pm$ 30	207.8 $\pm$ 28.86	183.2 $\pm$ 25.83	174.22 $\pm$ 26.9	172.5 $\pm$ 33.24
STG mg % mean $\pm$ SD	97.2 $\pm$ 16	106.66 $\pm$ 20.5	110 $\pm$ 20.33	99.9 $\pm$ 19.2	92 $\pm$ 19.54	89.5 $\pm$ 22.5
HDL mg % mean $\pm$ SD	34.8 $\pm$ 4.58	33.52 $\pm$ 5.52	32 $\pm$ 4.12	34 $\pm$ 4.61	35 $\pm$ 2.76	35 $\pm$ 3.36
LDL mg % mean $\pm$ SD	123.9 $\pm$ 14.94	140.56 $\pm$ 22.48	152.98 $\pm$ 22.5	127.9 $\pm$ 20.0	119.8 $\pm$ 21.01	116.1 $\pm$ 24.49
VLDL mg % mean $\pm$ SD	19.28 $\pm$ 3.3	21.2 $\pm$ 4.47	22.1 $\pm$ 3.89	20.38 $\pm$ 4.74	18.5 $\pm$ 4.11	17.9 $\pm$ 4.5
no of Cases	5	9	10	10	9	4

## PRE ECLAMPSIA GROUP

Case no 1

Patient - Manorama

23yrs

- \* Primi Gravida
- \* Middle Socioeconomic Status
- \* Vegetarian
- \* C/o Swelling over feet
- \* Paedal oedema present
- \* BP 146/96 mm Hg
- \* Obstetrical & other systemic examination NAD
- \* Urine - Albumin absent
- \* LFT & RFT normal
- \* No complications
- \* Out come  $\Rightarrow$  F.T.N.D, male baby wt.2.8 kg.

Values mg%

	II	III	IP period	24hrs PP	7th dPP	30th dPP
STC	-	171	180	160	156	-
STG	-	112	114	105	102	-
HDL	-	37	34	36	36	-
LDL	-	114.6	123.2	103	99.6	-
VLDL	-	22.4	22.8	21	20.4	-

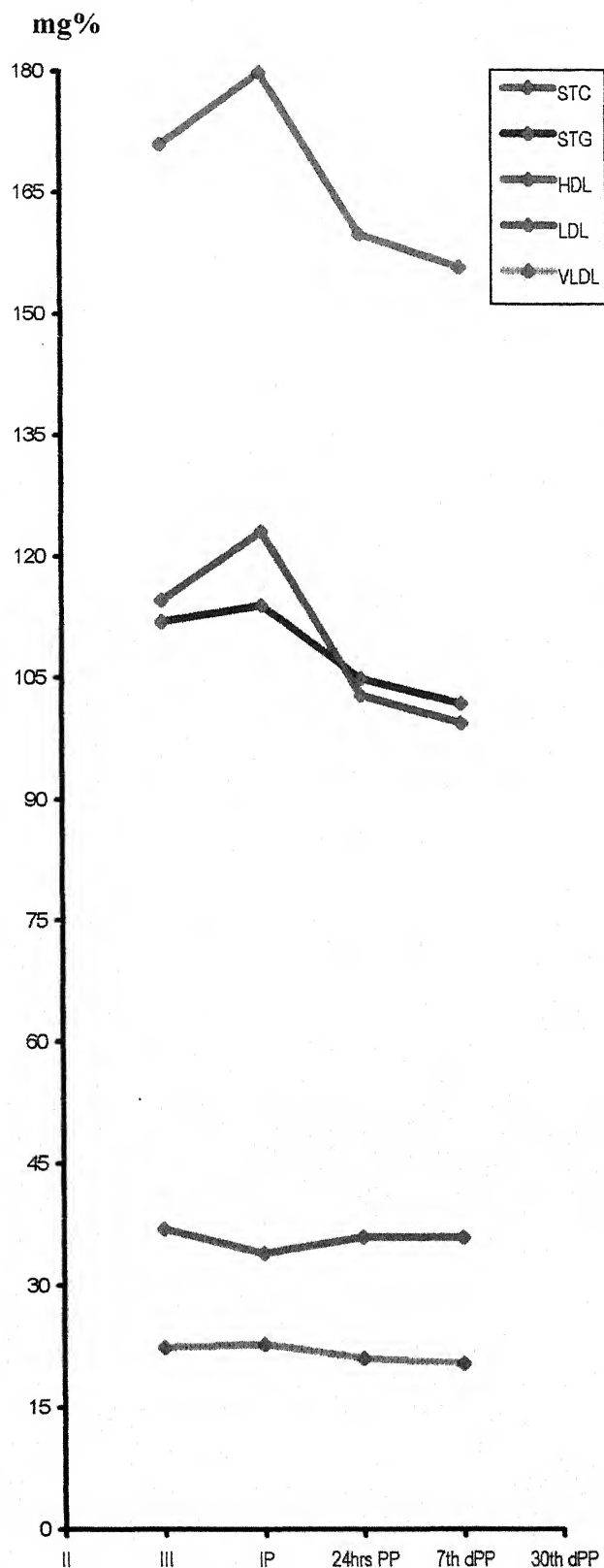
STC  $1\text{mmol/L} = 38.76\text{mg\%}$

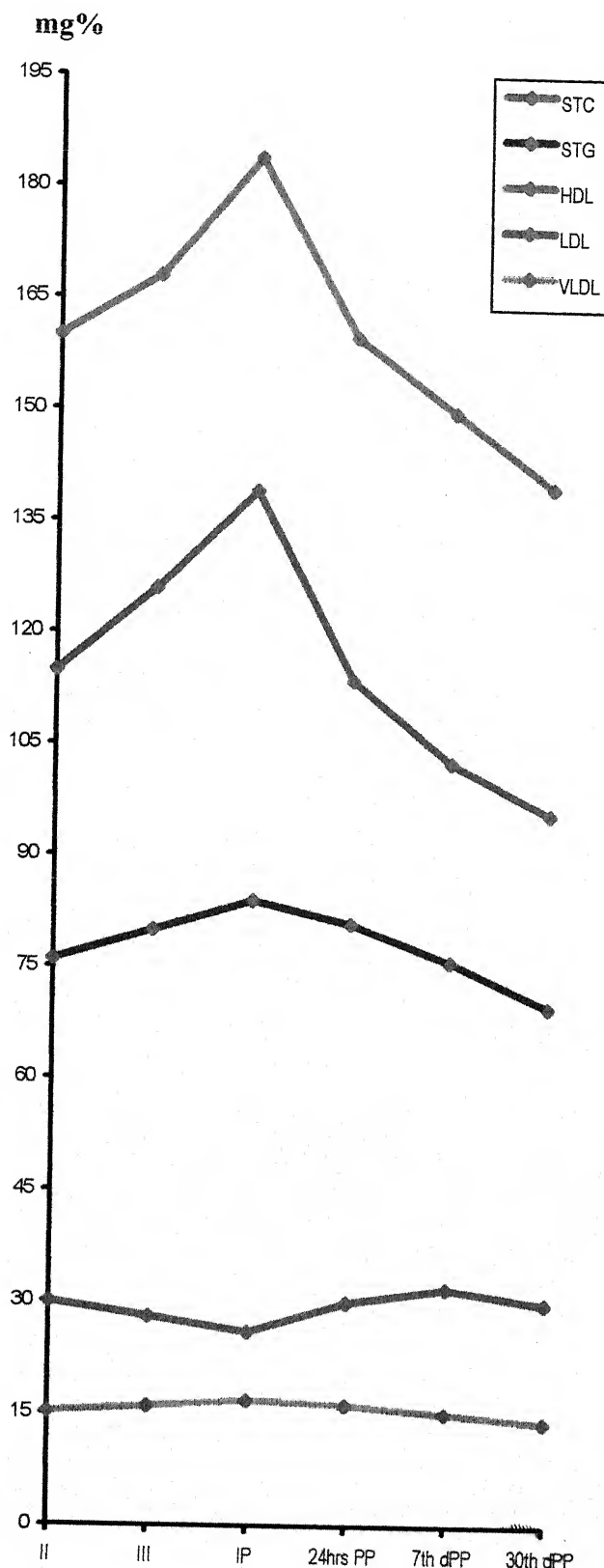
STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$

HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

- \* 5.26%  $\uparrow$  in STC, maximum value during labour
- \* 11.1%  $\downarrow$  in STC, with in 24hrs PP
- \* 9%  $\uparrow$  in LDL, maximum value during labour
- \* 17%  $\downarrow$  in LDL, with in 24hrs PP
- \* 8%  $\downarrow$  in HDL, up to labour





## PRE ECLAMPSIA GROUP

Case no 2

Patient - Mamta Jain  
21yrs

- \* Primi Gravida
- \* Middle Socioeconomic Status
- \* Vegetarian
- \* C/o Swelling over feet
- \* Paedal oedema present
- \* BP 150/100 mm Hg
- \* Obstetrical & other systemic examination NAD
- \* Urine - Albumin Present
- \* LFT & RFT normal
- \* No complications
- \* Out come  $\Rightarrow$  F.T.N.D, female baby  
wt. 2.6 kg.

Values in mg%

	II	III	IP	24hrs	7th	30th
			period	PP	dPP	dPP
STC	160	168	184	160	150	160
STG	76	80	84	81	76	70
HDL	30	28	26	30	32	30
LDL	114.8	126	139.2	113.8	102.8	96
VLDL	15.2	16	16.8	16.2	15.2	14

STC  $1\text{mmol/L} = 38.76\text{mg\%}$

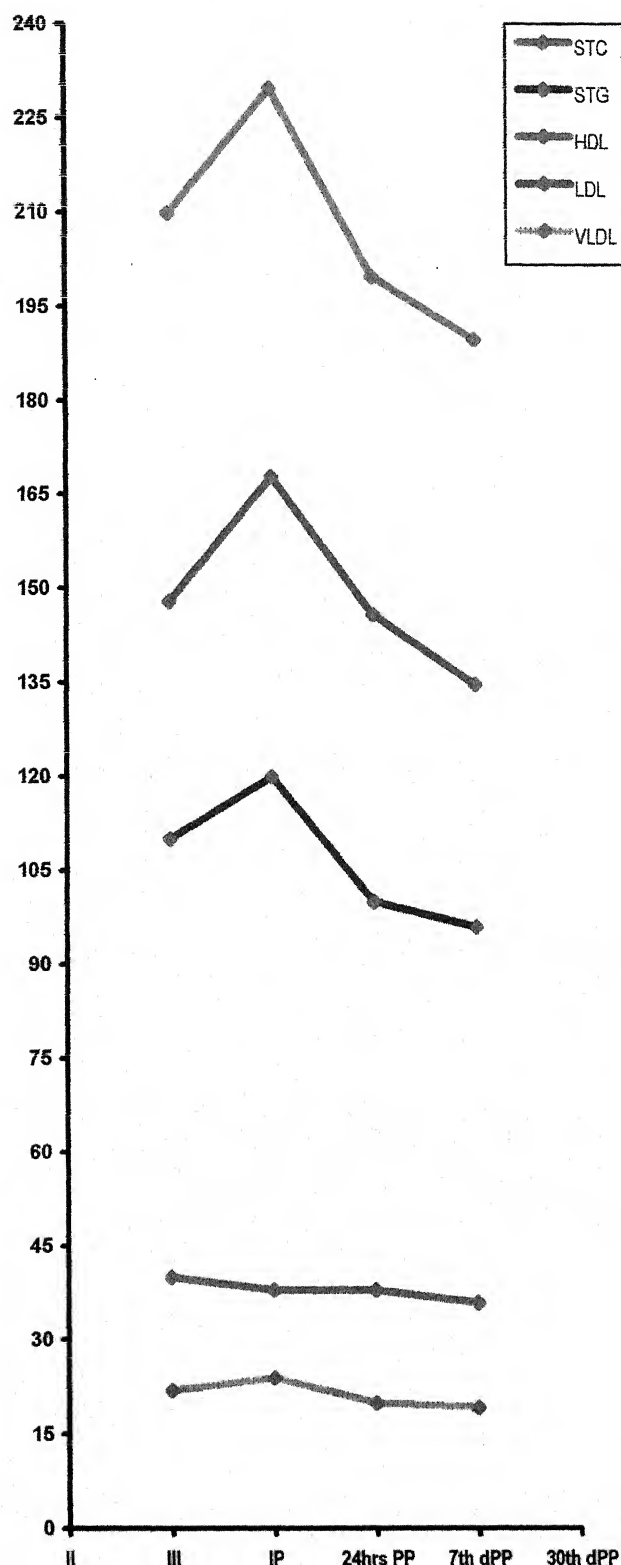
STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$

HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

- \* 15%  $\uparrow$  in STC, maximum value during labour
- \* 15%  $\downarrow$  in STC, with in 24hrs PP
- \* 16%  $\uparrow$  in LDL, maximum value during labour
- \* 16%  $\downarrow$  in LDL, with in 24hrs PP
- \* 11%  $\downarrow$  in HDL, up to labour

mg%



## PRE ECLAMPSIA GROUP

Case no 3

Patient - Parvati

20yrs

- \* *Primi Gravida*
- \* *Lower Socioeconomic Status*
- \* *Vegetarian*
- \* *C/o Excessive gain in body weight*
- \* *Paedal oedema present*
- \* *BP 160/104 mm Hg*
- \* *Obstetrical & other systemic examination NAD*
- \* *Urine - Albumin present*
- \* *LFT Normal & RFT Impaired*
- \* *Developed renal failure*
- \* *Out come  $\Rightarrow$  F.T.N.D, female baby wt. 2.6 kg.*

Values mg%

	II	III	IP	24hrs PP	7th dPP	30th dPP
STC	-	210	230	200	190	-
STG	-	110	120	100	96	-
HDL	-	40	38	38	36	-
LDL	-	148	168	146	134.8	-
VLDL	-	22	24	20	19.2	-

STC  $1\text{mmol/L} = 38.76\text{mg\%}$

STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$

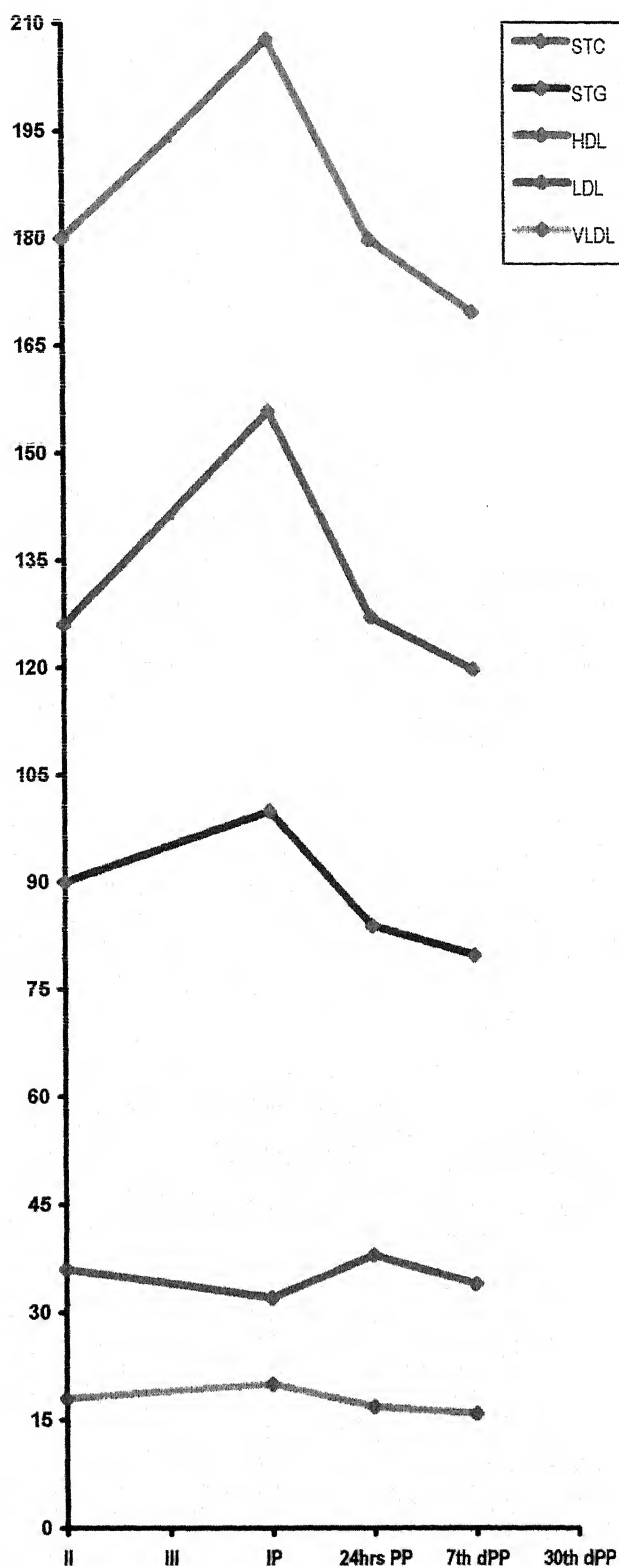
HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

- \* *10%  $\uparrow$  in STC, maximum value during labour*
- \* *13%  $\downarrow$  in STC, with in 24hrs PP*
- \* *13%  $\uparrow$  in LDL, maximum value during labour*
- \* *18%  $\downarrow$  in LDL, with in 24hrs PP*
- \* *5%  $\downarrow$  in HDL, up to labour*



mg%



## PRE ECLAMPSIA GROUP

Case no 4

Patient - Pupalai Rai  
26yrs

- \* G<sub>2</sub> P<sub>2</sub> L<sub>2</sub>
- \* Upper Socioeconomic Status
- \* Non - Vegetarian
- \* Detected on routine checkup
- \* **Paedal oedema present**
- \* BP 148/92 mm Hg
- \* Obstetrical & other systemic examination NAD
- \* Urine - Albumin absent
- \* LFT & RFT Normal
- \* No complications
- \* Out come  $\Rightarrow$  Elective C S, male baby wt. 2.9 kg.

Values mg%

	II	III	IP	24hrs	7th	30th
			period	PP	dPP	dPP
STC	180	-	208	180	170	-
STG	90	-	100	84	80	-
HDL	36	-	32	38	34	-
LDL	126	-	156	127.2	120	-
VLDL	18	-	20	16.8	16	-

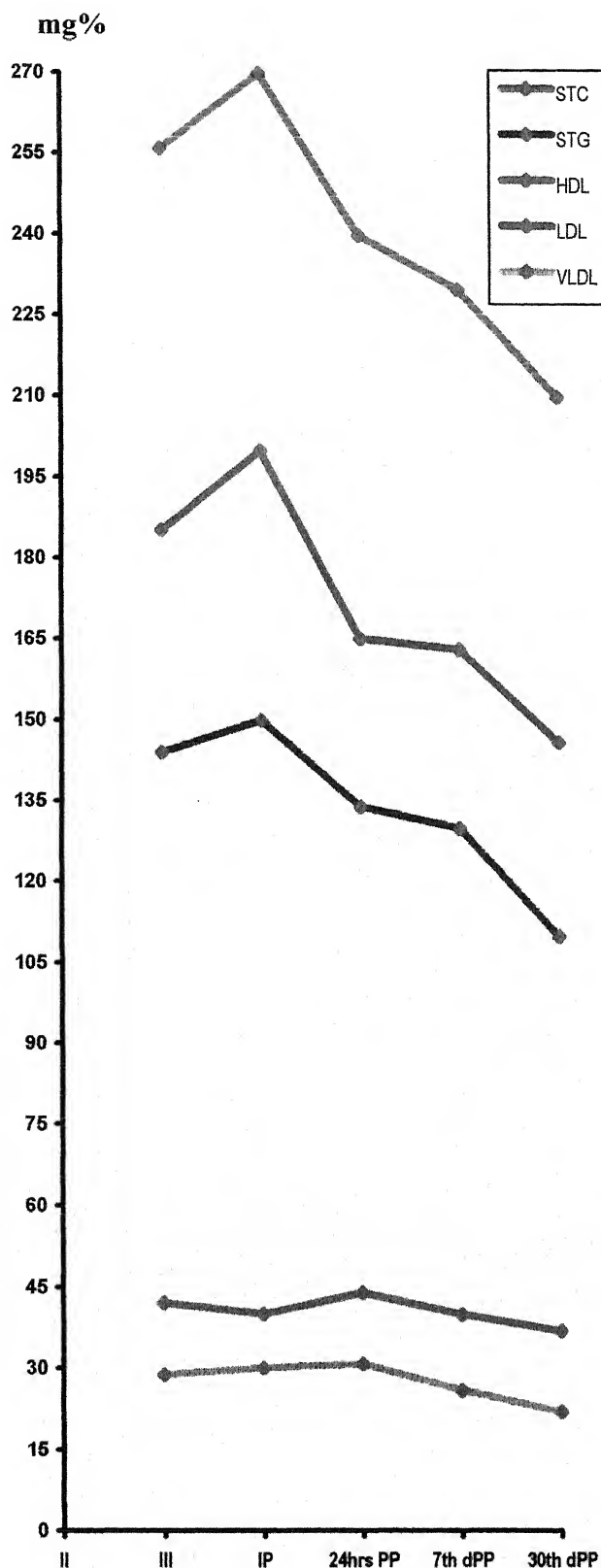
STC 1mmol/L = 38.76mg%

STG mmol/L = mg% $\times$ 0.0114

HDL mmol/L = mg%/38.76

### Legend:

- \* 16%  $\uparrow$  in STC, maximum value during labour
- \* 14%  $\downarrow$  in STC, with in 24hrs PP
- \* 16%  $\uparrow$  in LDL, maximum value during labour
- \* 13%  $\downarrow$  in LDL, with in 24hrs PP
- \* 11%  $\downarrow$  in HDL, up to labour



## PRE ECLAMPSIA GROUP

Case no 5

Patient - Sangeeta

22yrs

- \* Primi Gravida
- \* Upper Socioeconomic Status
- \* Non - Vegetarian
- \* C/o Swelling over feet
- \* Paedal oedema present
- \* BP 156/100 mm Hg
- \* Obstetrical & other systemic examination NAD
- \* Urine - Albumin absent
- \* LFT & RFT Normal
- \* No complications
- \* Out come  $\Rightarrow$  F.T.N.D, male baby wt. 2.8 kg.

Values mg%

	II	III	IP	24hrs	7th	30th
			period	PP	dPP	dPP
STC	-	256	270	240	230	210
STG	-	144	150	134	130	110
HDL	-	42	40	44	40	37
LDL	-	185.2	200	165.2	163	146
VLDL	-	28.8	30	30.8	26	22

STC  $1\text{mmol/L} = 38.76\text{mg\%}$

STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$

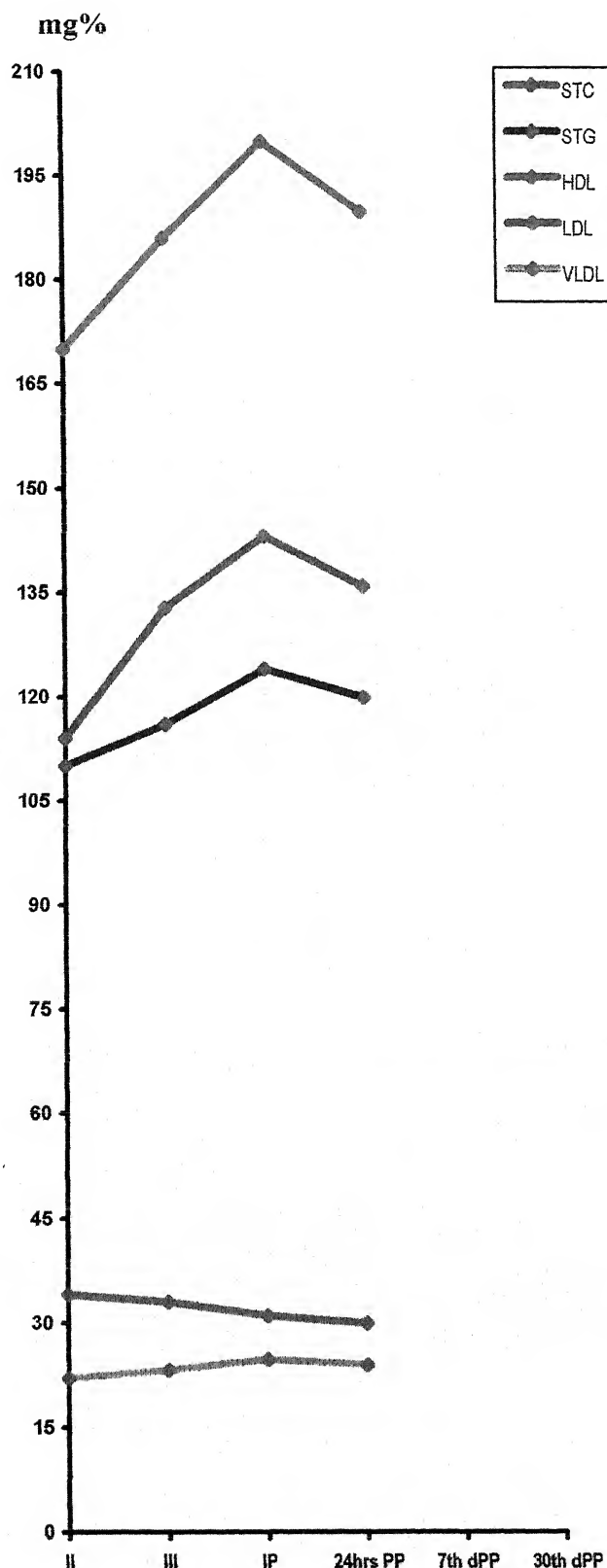
HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

- \* 6%  $\uparrow$  in STC, maximum value during labour
- \* 11%  $\downarrow$  in STC, with in 24hrs PP
- \* 9%  $\uparrow$  in LDL, maximum value during labour
- \* 17.5%  $\downarrow$  in LDL, with in 24hrs PP
- \* 5%  $\downarrow$  in HDL, up to labour



## PRE ECLAMPSIA GROUP



Case no 6

Patient - Sangeeta Jain  
26yrs

- \* G3P2L2
- \* Upper Socioeconomic Status
- \* Vegetarian
- \* Detected on routine checkup
- \* Paedal oedema present
- \* BP 144/100 mm Hg
- \* Obstetrical & other systemic examination NAD
- \* Urine - Albumin absent
- \* LFT & RFT Normal
- \* No complications
- \* Out come  $\Rightarrow$  F.T.N.D, male baby  
wt. 2.6 kg.

Values mg%

	II	III	IP	24hrs	7th	30th
			period	PP	dPP	dPP
STC	170	186	200	190	-	-
STG	110	116	124	120	-	-
HDL	34	33	31	30	-	-
LDL	114	132.8	143.2	136	-	-
VLDL	22	23.2	24.8	24	-	-

STC 1mmol/L = 38.76mg%

STG mmol/L = mg% $\times$ 0.0114

HDL mmol/L = mg%/38.76

### Legend:

- \* 17%  $\uparrow$  in STC, maximum value during labour
- \* 5%  $\downarrow$  in STC, with in 24hrs PP
- \* 18%  $\uparrow$  in LDL, maximum value during labour
- \* 5%  $\downarrow$  in LDL, with in 24hrs PP
- \* 9%  $\downarrow$  in HDL, up to labour

## PRE ECLAMPSIA GROUP

Case no 7

Patient - Guddi  
22yrs

- \* G2P2L2
- \* Lower Socioeconomic Status
- \* Vegetarian
- \* C/o Excessive gain in bodyweight
- \* Paedal oedema present
- \* BP 148/104 mm Hg
- \* Obstetrical & other systemic examination NAD
- \* Urine - Albumin absent
- \* LFT & RFT Normal
- \* No complications
- \* Out come  $\Rightarrow$  F.T.N.D, female baby  
wt. 2.6 kg.

Values mg%

	II	III	IP period	24hrs PP	7th dPP	30th dPP
STC	-	184	190	160	156	150
STG	-	86	90	80	72	70
HDL	-	33	31	33	37	36
LDL	-	131.8	141	111	104.6	96
VLDL	-	17.2	18	16	14.4	14

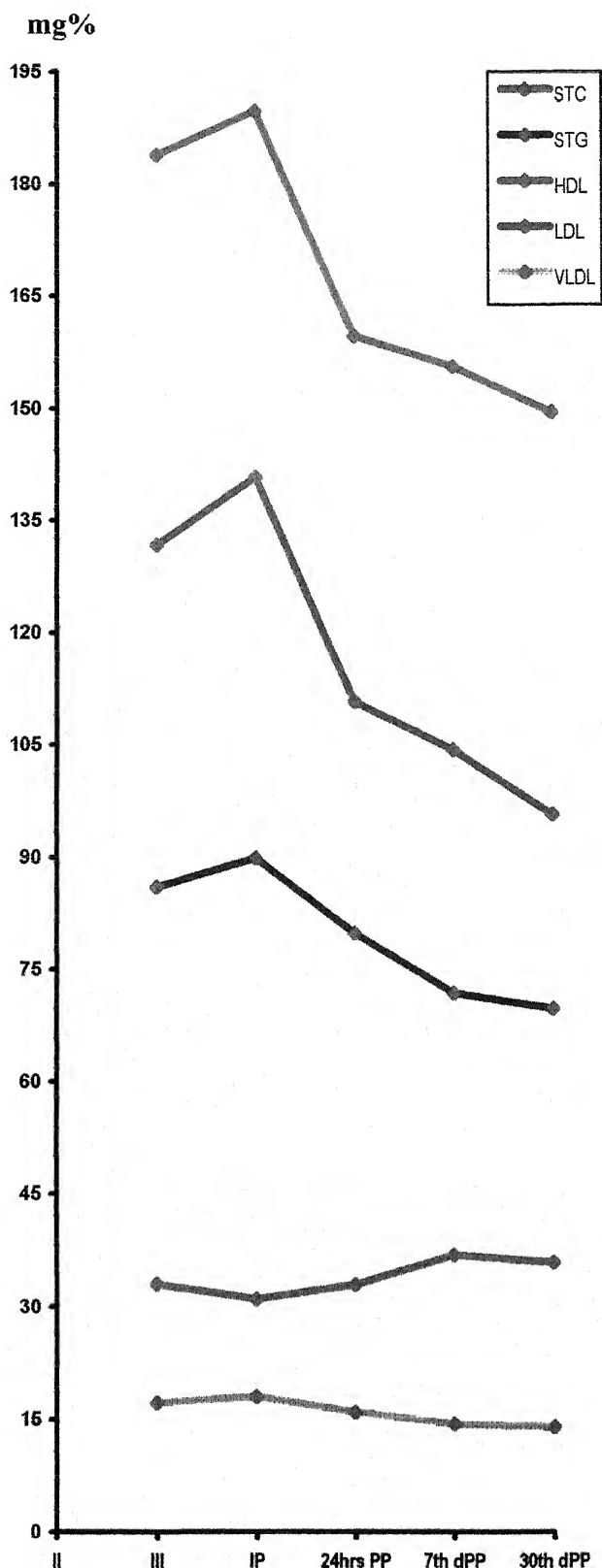
STC  $1\text{mmol/L} = 38.76\text{mg\%}$

STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$

HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

- \* 4%  $\uparrow$  in STC, maximum value during labour
- \* 16%  $\downarrow$  in STC, with in 24hrs PP
- \* 9%  $\uparrow$  in LDL, maximum value during labour
- \* 23%  $\downarrow$  in LDL, with in 24hrs PP
- \* 6%  $\downarrow$  in HDL, up to labour



## PRE ECLAMPSIA GROUP

Case no 8

Patient - Sudha  
24yrs

- \* Primi Gravida
- \* Lower Socioeconomic Status
- \* Vegetarian
- \* Detected on routine checkup
- \* Paedal oedema Absent
- \* BP 180/110 mm Hg
- \* Obstetrical & other systemic examination NAD
- \* Urine - Albumin present
- \* LFT & RFT Normal
- \* Out come  $\Rightarrow$  Premature  
Vaginal delivery, female baby  
wt. 2.0 kg.

Values mg%

	II	III	IP period	24hrs PP	7th dPP	30th dPP
STC	166	176	190	164	156	-
STG	90	96	100	90	82	-
HDL	32	28	28	32	34	-
LDL	116	128.8	140	114	105.6	-
VLDL	18	19.2	20	18	16.4	-

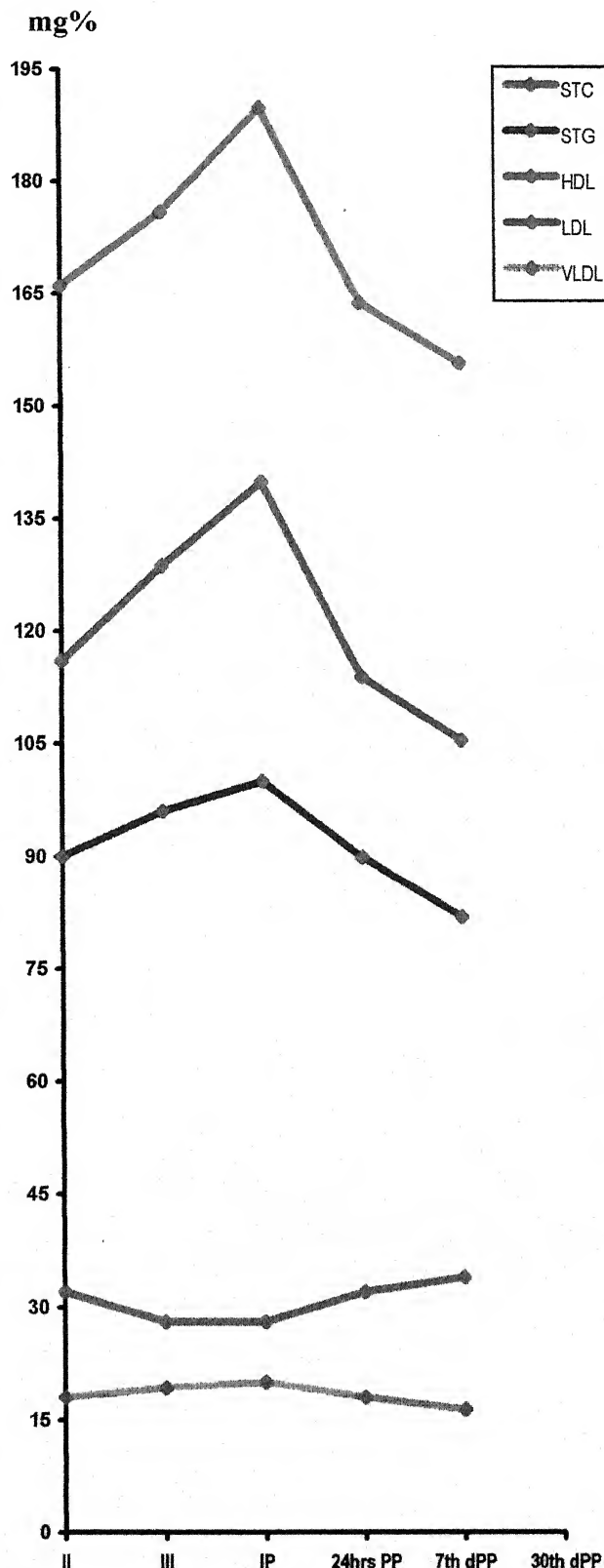
STC  $1\text{mmol/L} = 38.76\text{mg\%}$

STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$

HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

- \* 15%  $\uparrow$  in STC, maximum value during labour
- \* 14%  $\downarrow$  in STC, with in 24hrs PP
- \* 19%  $\uparrow$  in LDL, maximum value during labour
- \* 19%  $\downarrow$  in LDL, with in 24hrs PP
- \* 12%  $\downarrow$  in HDL, up to labour



## PRE ECLAMPSIA GROUP

Case no 9

Patient - Kiran  
24yrs

- \* G3P2L2
- \* Middle Socioeconomic Status
- \* Non Vegetarian
- \* C/o Swelling over feet
- \* Paedal oedema present
- \* BP 152/96 mm Hg
- \* Obstetrical & other systemic examination NAD
- \* Urine - Albumin present
- \* LFT Impaired & RFT Normal
- \* Out come  $\Rightarrow$  F.T.N.D, female baby  
wt. 2.25 kg.

Values mg%

	II	III	IP	24hrs	7th	30th
			period	PP	dPP	dPP
STC	-	180	190	168	160	-
STG	-	88	96	85	78	-
HDL	-	36	34	36	34	-
LDL	-	128.4	136.8	115	110.4	-
VLDL	-	17.6	19.2	17	15.6	-

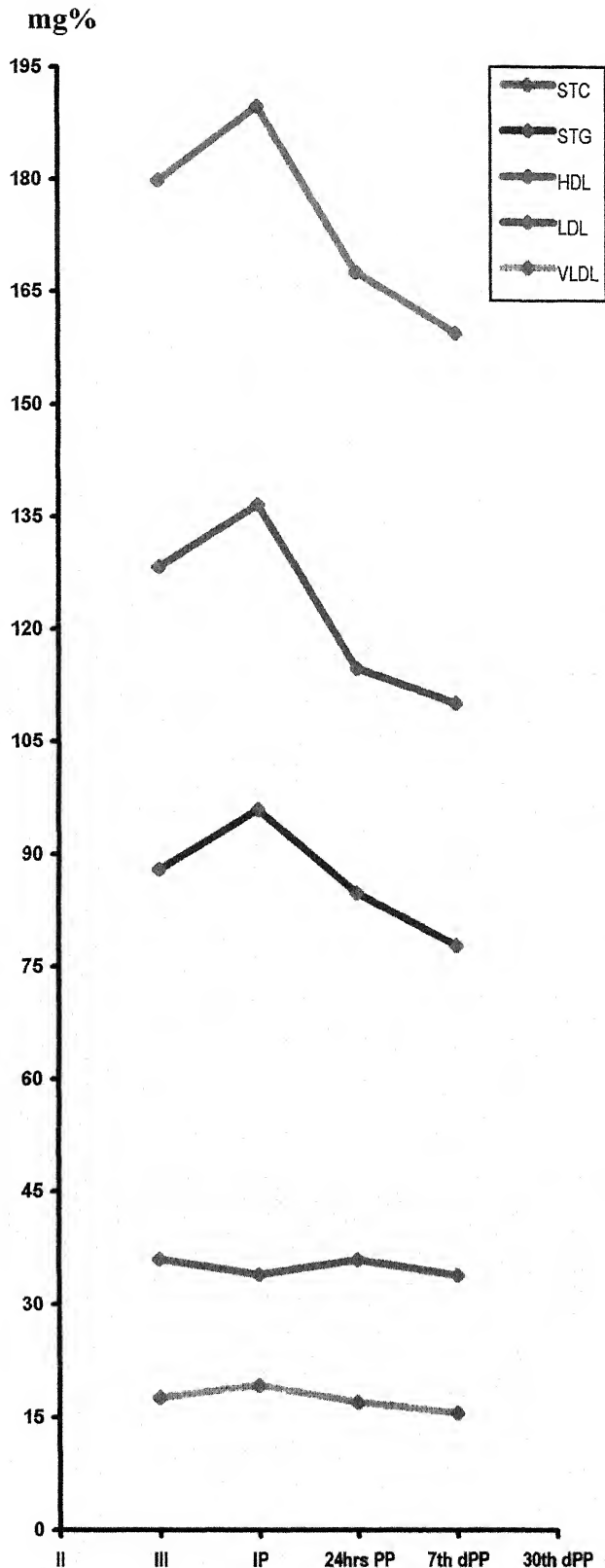
STC  $1\text{mmol/L} = 38.76\text{mg\%}$

STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$

HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

- \* 6%  $\uparrow$  in STC, maximum value during labour
- \* 12%  $\downarrow$  in STC, with in 24hrs PP
- \* 9%  $\uparrow$  in LDL, maximum value during labour
- \* 16%  $\downarrow$  in LDL, with in 24hrs PP
- \* 6%  $\downarrow$  in HDL, up to labour



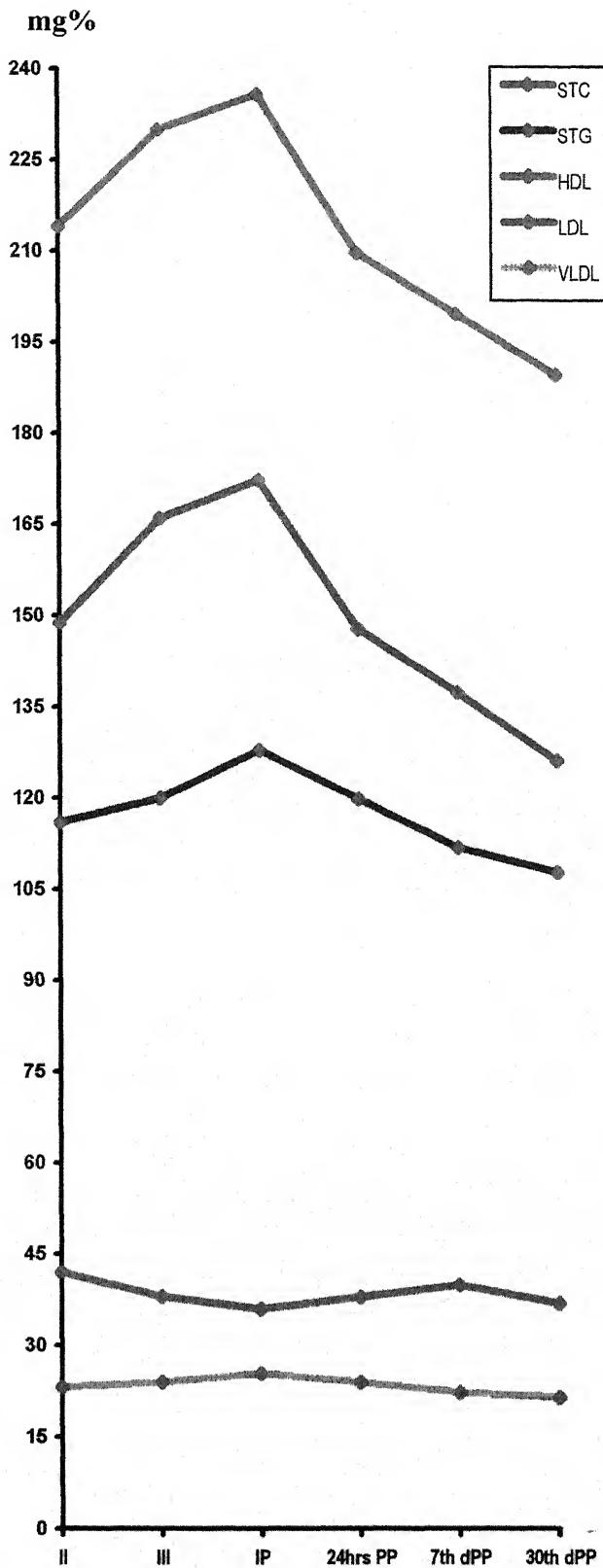
## PRE ECLAMPSIA GROUP

Case no 10

Patient - Vimla  
22yrs

- \* Primi Gravida
- \* Lower Socioeconomic Status
- \* Vegetarian
- \* C/o Swelling over feet
- \* Paedal oedema present
- \* BP 148/104 mm Hg
- \* Obstetrical & other systemic examination NAD
- \* Urine - Albumin absent
- \* LFT & RFT Normal
- \* Out come  $\Rightarrow$  Premature Vaginal delivery male baby

wt. 2.4 kg.



Values mg%

	II	III	IP period	24hrs PP	7th dPP	30th dPP
STC	214	230	236	210	200	190
STG	116	120	128	120	112	108
HDL	42	38	36	38	40	37
LDL	149	169	172	148	137.6	126.4
VLDL	23	24	25.6	24	22.4	21.6

STC  $1\text{mmol/L} = 38.76\text{mg\%}$

STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$

HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

- \* 11%  $\uparrow$  in STC, maximum value during labour
- \* 13%  $\downarrow$  in STC, with in 24hrs PP
- \* 14%  $\uparrow$  in LDL, maximum value during labour
- \* 12%  $\downarrow$  in LDL, with in 24hrs PP
- \* 11%  $\downarrow$  in HDL, up to labour

Table II shows that STC level raised from  $178.33 \pm 21$  to  $196.77 \pm 30$  from II<sup>nd</sup> trimester to III<sup>rd</sup> trimester and reaching a peak during intra partum period of  $207.8 \pm 28.86$  mg % this rise from II<sup>nd</sup> trimester to intra partum period was statically significant

II Vs I.P.	$P < .001$
Similarly IP Vs PP 1 <sup>st</sup> d	$P < .001$
IP Vs PP 7 <sup>th</sup> d	$P < .001$
II Vs III	$P < .05$
III Vs I.P.	$P > .05$

LDL raised from a Basal value of  $123.9 \pm 14.94$  during II<sup>nd</sup> trimester to  $152.98 \pm 22.50$  during intra partum period. This difference was statistically significant

II Vs I.P.	$p < .001$
------------	------------

This LDL reached to values nearly equal to value at 2<sup>nd</sup> trimester on 30<sup>th</sup> post partum day

IP Vs PP 7 <sup>th</sup> day	$p < .05$
IP Vs PP 30 <sup>th</sup> day	$p < .05$
II Vs III	$p < .05$

HDL level was  $34.8 \pm 4.58$  during II<sup>nd</sup> trimester, it declined to  $32.0 \pm 4.12$  during labour and then again raised to  $35.0 \pm 3.36$  on the 30<sup>th</sup> post partum day.

II Vs I.P.	$p < 0.05$
III Vs I.P.	$p > .05$

STG and VLDL showed a peak during labour from their values at 2<sup>nd</sup> trimester of  $97.2 \pm 16$  and  $19.28 \pm 3.3$  to  $110 \pm 20.33$  to  $22.1 \pm 3.89$  respectively. This rise in STG and VLDL was significant statistically

II <sup>nd</sup> Vs IP	$p < .05$
------------------------	-----------

**TABLE III**  
**serum lipoprotein profile in cases of mild preeclampsia**

	II trimester	III trimester	IP period	24 hrs PP	7th day PP	30th day PP
STC mg % mean $\pm$ SD	$188 \pm 23.06$	$205.2 \pm 35.98$	$214.33 \pm 33.4$	$190 \pm 30.98$	$182.4 \pm 32.09$	$183.33 \pm 30.55$
STG mg % mean $\pm$ SD	$105.33 \pm 13.6$	$117 \pm 20.68$	$120.6 \pm 21.35$	$107.33 \pm 21.56$	$98.4 \pm 22.71$	$96 \pm 22.53$
HDLmg % mean $\pm$ SD	$36.3 \pm 2.3$	$35.2 \pm 3.2$	$33.8 \pm 4.42$	$36.5 \pm 3.8$	$37.4 \pm 2.82$	$36.8 \pm 2.4$
LDL mg % mean $\pm$ SD	$129.33 \pm 22.33$	$146.6 \pm 27.16$	$155.8 \pm 27.11$	$131.83 \pm 23.09$	$125.4 \pm 25.37$	$122 \pm 25.15$
VLDL mg % mean $\pm$ SD	$21 \pm 2.64$	$23.2 \pm 4.19$	$24.12 \pm 4.28$	$21.5 \pm 5.68$	$19.68 \pm 4.95$	$19.2 \pm 4.85$
no of Cases	3	5	6	5	5	3



Table III shows that STC raised from a mean of  $188 \pm 23.06$  to  $214.33 \pm 33.4$  during labour and then came down to  $182.4 \pm 32.09$  at 7<sup>th</sup> P.P. day . The fall in STC from I.P. period to 7<sup>th</sup> P.P. day was stastically significant

II Vs IP	$p < .05$
IP Vs PP 1 <sup>st</sup> day	$p < .05$
IP Vs PP 7 <sup>th</sup> day	$p < .05$
IP Vs PP 30 <sup>th</sup> day	$p < .05$

. LDL raised from it's value at 2<sup>nd</sup> trimester of  $129.33 \pm 22.36$  to  $155.8 \pm 27.11$  during labour and came down to  $125.4 \pm 25.37$  on 7<sup>th</sup> P.P. day . This was statistically significant

II Vs I.P.	$P < .05$
I.P. Vs 1 <sup>st</sup> PP	
I.P. Vs 7 <sup>nd</sup> PP	
I.P. Vs 30 <sup>th</sup> day PP	

HDL declined from  $36.3 \pm 2.3$  at 2<sup>nd</sup> trimester to a value of  $33.8$  mg % and then raised again. mean STG was  $105.33 \pm 13.61$  at 2<sup>nd</sup> trimester reached a peak to  $120.6 \pm 21.35$  mg % term and then started falling reaching to  $96$  mg % at 30<sup>th</sup> post partum day . Similar trend was followed by VLDL also.

**Table IV**  
**serum lipoprotein profile in cases of severe preeclampsia**

	II trimester	III trimester	IP period	24 hrs PP	7th day PP	30th day PP
STC mg % mean $\pm$ SD	$163 \pm 4.24$	$183.5 \pm 18.35$	$198.5 \pm 21.18$	$173 \pm 18.87$	$164 \pm 17.8$	$140 \pm 0$
STG mg % mean $\pm$ SD	$83 \pm 9.89$	$95.33 \pm 12.96$	$101.33 \pm 15.16$	$90 \pm 15.09$	$84.66 \pm 9.16$	$70 \pm 0$
HDLmg % mean $\pm$ SD	$32 \pm 1.41$	$31.5 \pm 5.74$	$30 \pm 4.43$	$33 \pm 3.65$	$34 \pm 1.63$	$30 \pm 0$
LDL mg % mean $\pm$ SD	$115.4 \pm 8.2$	$132.57 \pm 10.19$	$146.25 \pm 13.52$	$122.54 \pm 16.58$	$113 \pm 14.62$	$96 \pm 0$
VLDL mg % mean $\pm$ SD	$16.6 \pm 1.97$	$19.06 \pm 2.95$	$20.2 \pm 3.17$	$16 \pm 2.64$	$16.9 \pm 1.83$	$14 \pm 0$
no of Cases	2	4	4	4	4	1

Table IV shows that STC raised markedly from II<sup>nd</sup> trimester to III<sup>rd</sup> trimester and from III<sup>rd</sup> trimester to intra partum period . it's value was  $163 \pm 4.24$  at 2<sup>nd</sup> trimester and  $198.5 \pm 21.18$  mg % during labour . The fall was maximum at the 30<sup>th</sup> PP day when it was  $140$  mg % . Similarly LDL raised from  $115 \pm 8.2$  at 2<sup>nd</sup> trimester to  $146.25 \pm 13.52$  during labour and declined there after reaching to  $113 \pm 14.62$  at 7<sup>th</sup> P.P. day and  $96$  mg % on 30<sup>th</sup> P.P. day . STG raised from  $83 \pm 9.89$  at 2<sup>nd</sup> trimester to a peak during labour of



101.33  $\pm$  15.16 mg and then declined thereafter . Interestingly HDL decreased very less from 32  $\pm$  1.41 mg % at 2<sup>nd</sup> trimester to 30.0  $\pm$  4.43 during labour.

For STC      II Vs III              p < .05  
                  II Vs I.P.            p < .001  
                  IP VS 7<sup>th</sup> PP        p < .001  
                  IP Vs 30<sup>th</sup> PP        p < .001

For LDL      II Vs III              p < .05  
                  II Vs IP                p < .001  
                  I.P. Vs 1<sup>st</sup> PP        p < .001  
                  I.P. Vs 7<sup>th</sup> PP        p < .001  
                  I.P. Vs 30<sup>th</sup>        P < .001

**TABLE V**

**Serum Lipoprotein Profile in Pre-eclampsia cases with low Birth Weight babies**

	II trimester	III trimester	IP period	24 hrs PP	7th day PP	30th day PP
STC mg%	190 $\pm$	195.33 $\pm$	205 $\pm$	180.66 $\pm$	172 $\pm$	190 $\pm$
mean $\pm$ SD	33.94	30.09	26.56	25.44	24.33	0
STG mg%	103 $\pm$	101.33 $\pm$	108.0 $\pm$	98.33 $\pm$	90.66 $\pm$	108 $\pm$
mean $\pm$ SD	18.33	14.23	17.43	18.43	18.58	0
HDLmg%	37 $\pm$	33.3 $\pm$	32 $\pm$ 4	35.33 $\pm$	36.0 $\pm$	36 $\pm$
mean $\pm$ SD	7.07	4.58		3.08	2.82	0
LDLmg%	132.5 $\pm$	141.66 $\pm$	151.6 $\pm$	126.66 $\pm$	114.0 $\pm$	126 $\pm$
mean $\pm$ SD	22.62	23.68	19.46	19.35	17.69	0
VLDL	20.6 $\pm$	20.3 $\pm$	21.6 $\pm$	19.7 $\pm$ 3.9	18.13 $\pm$	21.6 $\pm$
mg%	9.8	4.2	3.5		3.9	0
mean $\pm$ SD						
no of case	2	3	3	3	3	1

Table V shows that STC raised from 190  $\pm$  33.94 mg at 2<sup>nd</sup> trimester to 205  $\pm$  26.56 during labour and then declined to 172  $\pm$  24.3 mg % at 7<sup>th</sup> PP day\_ . This rise statistically significant .

II Vs IP              p < .05  
 IP Vs 7<sup>th</sup> PP day p < .001  
 IP Vs 1<sup>st</sup> PP day p < .05

LDL raised from 132.5  $\pm$  22.62 mg % at 2<sup>nd</sup> trimester to 141.66  $\pm$  23.68 at 3<sup>rd</sup> trimester , reaching a peak at labour of 151.6  $\pm$  19.46 then declined to 126.41  $\pm$  19.35 at 1<sup>st</sup> P.P. day and 114.0  $\pm$  17.69 at 7<sup>th</sup> PP day .

II Vs IP              p < .05  
 IP Vs 1<sup>st</sup> PP day    p < .05

IP Vs 7<sup>th</sup> PP day  $p < .05$

IP Vs 30<sup>th</sup> PP day  $p < .05$

HDL decreased from  $37.0 \pm 7.07$  at 2nd trimester to  $32 \pm 4$  at labour . This fall was statistically significant

II Vs IP  $< .05$

STG and VLDL showed a very small rise in their value maximum during labour.

**Table VI**

**Lipoprotein profile regarding parity in subjects with pre-eclampsia**

	Parity	II trimester	III trimester	IP period	24 hrs PP	7th day PP	30th day PP
STC mg % mean $\pm$ SD	Primi	$180 \pm 29.59$	$201.66 \pm 36.2$	$215 \pm 36.09$	$188.33 \pm 33.09$	$180 \pm 31.78$	$180 \pm 36.05$
	Multi	$175 \pm 7.07$	$183.33 \pm 3.08$	$200 \pm 9.38$	$194.5 \pm 27.1$	$162.0 \pm 7.21$	$150 \pm 0$
LDL mg % mean $\pm$ SD	Primi	$126. \pm 66 15.95$	$130.5 \pm 34.46$	$156.66 \pm 28.06$	$131.83 \pm 38.03$	$125.0 \pm 25.13$	$122.0 \pm 25.17$
	Multi	$120 \pm 36$	$131 \pm 2.54$	$144.2 \pm 8.22$	$122.25 \pm 11.4$	$111.66 \pm 8.09$	$96 \pm 0$
HDL mg % mean $\pm$ SD	Primi	$35 \pm 6.44$	$34.5 \pm 6.40$	$33.50 \pm 4.89$	$35.33 \pm 4.97$	$35.3 \pm 3.22$	$34.66 \pm 4.12$
	Multi	$35 \pm 1.41$	$32.3 \pm 2.12$	$31.0 \pm 1.52$	$33.5 \pm 3.51$	$35 \pm 1.73$	$35 \pm 0$
no of Cases	Primi	3	6	6	6	6	3
	Multi	2	3	4	4	3	1

. This shows that STC and LDL values were higher in Primi Gravidae in comparison to Multi Gravidae in the corresponding period of pregnancy during labour and in post partum period . This difference was however statistically not significant . At 30<sup>th</sup> PP day STC and LDL was  $180 \pm 36.05$  and  $122 \pm 25.17$  mg % . In primi Gravidae and  $150$  mg % and  $96$  mg % in multi Gravidae . there was not much difference in HDL values in both subgroups. Except during labour it was high in primigravidae.

**Multiple BAR diagram showing changes in various lipid fraction during pregnancy and labour in patients with preeclmpsia**

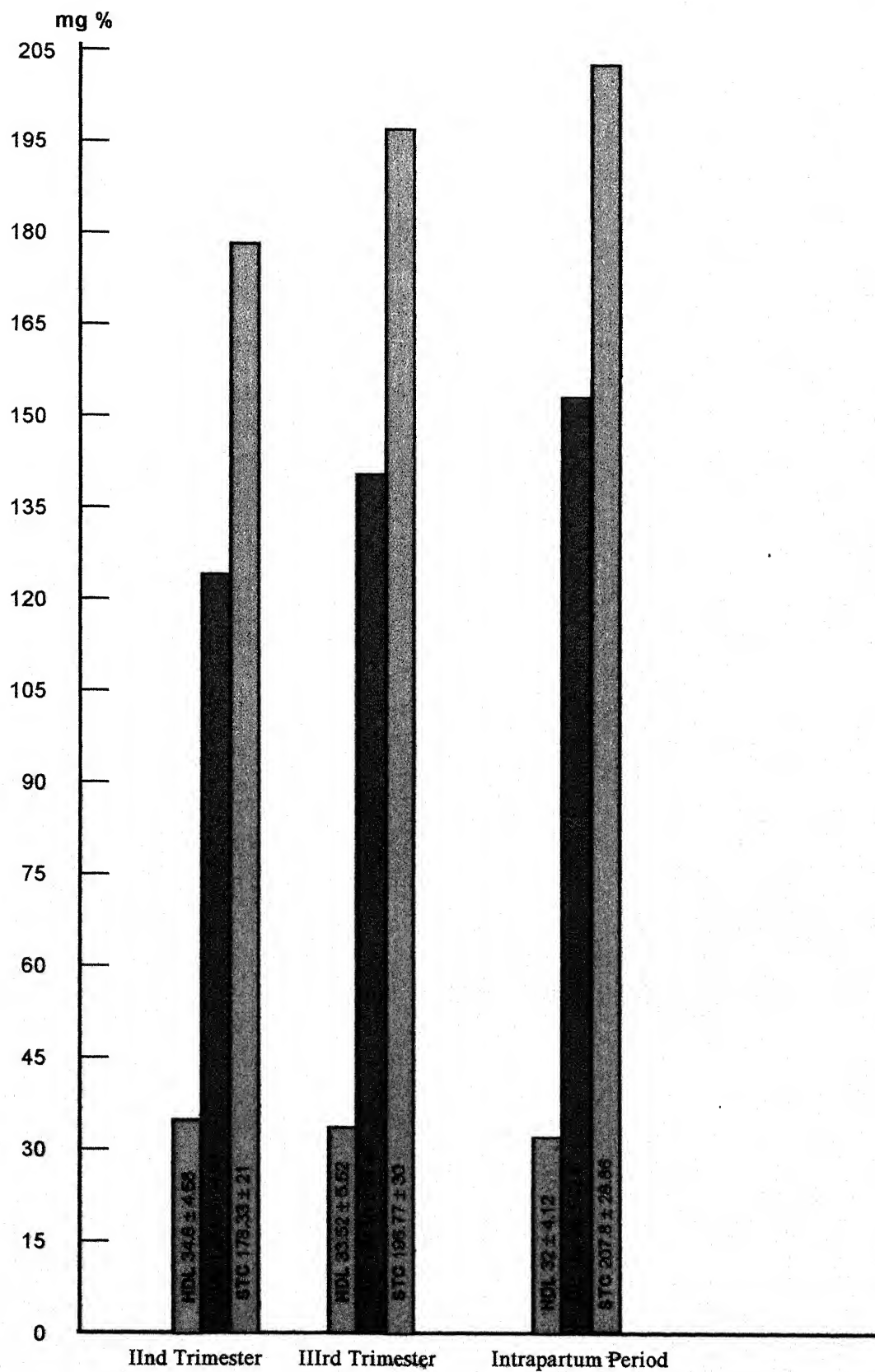


TABLE VII

Serum Lipoprotein profile in cases of eclampsia during Antepartum, Intrapartum & post partum period

	IInd trimester	IIIrd trimester	IP period	1st post partum day	7th post partum day	30th post partum day
STC mg % Mean $\pm$ SD	---	219.37 $\pm$ 36.3	234.41 $\pm$ 40.17	209.75 $\pm$ 31.2	199.75 $\pm$ 28.6	180.83 $\pm$ 24.5
STG mg % Mean $\pm$ SD	---	111.75 $\pm$ 24.79	114.82 $\pm$ 26.46	103.56 $\pm$ 21.49	97.87 $\pm$ 19.7	85.5 $\pm$ 18.02
HDL mg % Mean $\pm$ SD	---	32.4 $\pm$ 3.96	29 $\pm$ 4.47	30.1 $\pm$ 5.4	28.25 $\pm$ 6.51	29.6 $\pm$ 3.88
LDL mg % mean $\pm$ SD	---	156.88 $\pm$ 29.96	178.82 $\pm$ 32.03	157.37 $\pm$ 20.87	148 $\pm$ 25.69	131 $\pm$ 16.27
VLDL mg % mean $\pm$ SD	---	22.35 $\pm$ 5.12	23 $\pm$ 5.38	22.25 $\pm$ 4.40	19.5 $\pm$ 3.94	17 $\pm$ 3.94
no of cases (n)	---	17	17	16	16	6

Table VII shows that STC raised from 219.37  $\pm$  36.3 mg at 3rd trimester to 234.41  $\pm$  40.17 mg % at term and then declined to 209.75  $\pm$  31.2 at 1st P.P. day, 199.75  $\pm$  28.6 at 7th P.P. day and 180.83  $\pm$  24.5 mg % at 30th P.P. day. Rise from IIIrd trimester to I.P. period was statistically insignificant.

III Vs I.P.  $p < .001$   
 IP Vs 1st PP day  $p < .001$   
 IP Vs 7th PP day  $p < .001$   
 IP Vs 30th PP day  $p < .001$

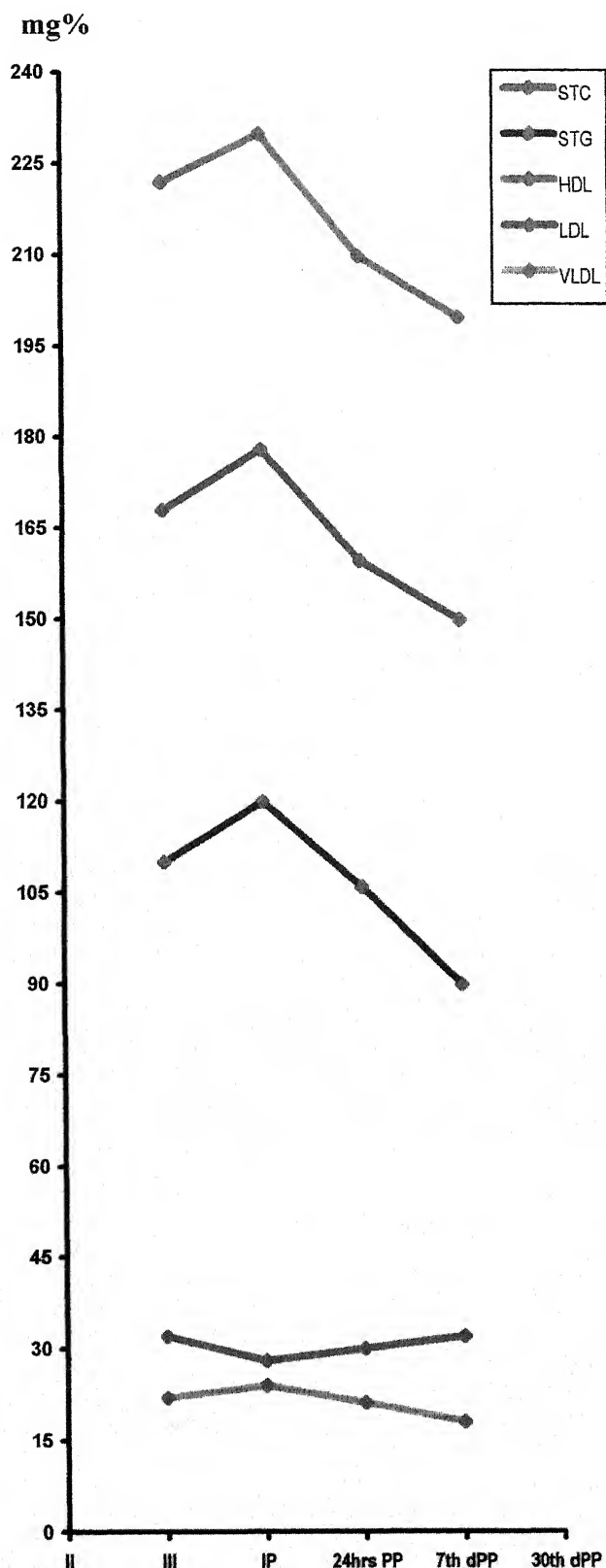
LDL raised from 156.88  $\pm$  29.96 mg % at 3rd trimester to 178.82  $\pm$  32 during labour which declined to 157.37  $\pm$  20.87 at 1st Pp day and 131  $\pm$  16.27 at 30th PP day.

III Vs IP  $p < .001$   
 IP Vs 1st PP day  $p < .001$   
 IP Vs 7th PP day  $p < .001$   
 IP Vs 30th PP day  $p < .001$

HDL value was 32.41  $\pm$  3.96 at 3rd trimester which declined to 29  $\pm$  4.47 during labour then raised to 30.1  $\pm$  5.4 on 1st P.P. day, again raised to 28.25  $\pm$  6.51 on 7th PP day.

III Vs IP  $p < .001$

There was very slight rise in STG & VLDL upto labour from 3rd trimester.



## ECLAMPSIA GROUP

Case no 1

Patient - Rajni  
23yrs

- \* Primi Gravida
- \* Middle Socioeconomic Status
- \* Non Vegetarian
- \* C/o Convulsions for one day
- \* Paedal oedema present
- \* BP 160/110 mm Hg
- \* Obstetrical & other systemic examination NAD
- \* Urine - Albumin present
- \* LFT & RFT Normal
- \* Out come  $\Rightarrow$  Premature Vaginal delivery female baby

wt. 2.4 kg.

Values mg%

	II	III	IP	24hrs	7th	30th
			period	PP	dPP	dPP
STC	-	222	230	210	200	-
STG	-	110	120	106	90	-
HDL	-	32	26	30	32	-
LDL	-	168	178	159.8	150	-
VLDL	-	22	24	21.2	18	-

STC 1mmol/L = 38.76mg%

STG mmol/L = mg% $\times$ 0.0114

HDL mmol/L = mg%/38.76

### Legend :

- \* 5%  $\uparrow$  in STC, maximum value during labour
- \* 9%  $\downarrow$  in STC, with in 24hrs PP
- \* 8%  $\uparrow$  in LDL, maximum value during labour
- \* 12%  $\downarrow$  in LDL, with in 24hrs PP
- \* 12%  $\downarrow$  in HDL, up to labour



## ECLAMPSIA GROUP

Case no 2

Patient - Guddi  
26yrs

- \* G3P2L2
- \* Lower Socioeconomic Status
- \* Vegetarian
- \* Unconscious during admission
- \* BP 150/100 mm Hg
- \* Obstetrical & other systemic examination NAD
- \* Urine - Albumin present
- \* LFT Normal & RFT Impaired
- \* Outcome  $\Rightarrow$  Spontaneous expulsion of male dead fetus

Values mg%

	II	III	IP period	24hrs PP	7th dPP	30th dPP
STC	-	210	270	230	220	-
STG	-	130	150	110	110	-
HDL	-	27	22	24	22	-
LDL	-	157	218	184	176	-
VLDL	-	26	30	22	22	-

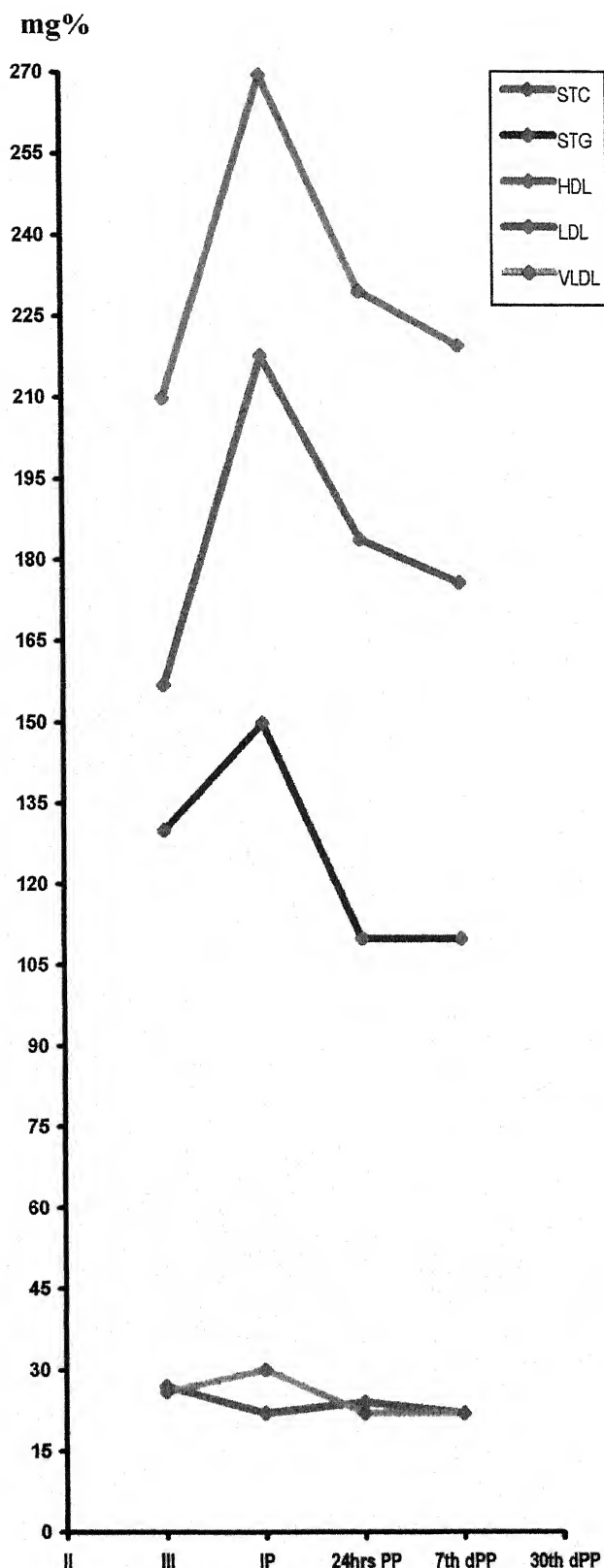
STC  $1\text{mmol/L} = 38.76\text{mg\%}$

STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$

HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

- \* 29%  $\uparrow$  in STC, maximum value during labour
- \* 15%  $\downarrow$  in STC, with in 24hrs PP
- \* 35%  $\uparrow$  in LDL, maximum value during labour
- \* 14%  $\downarrow$  in LDL, with in 24hrs PP
- \* 19%  $\downarrow$  in HDL, up to labour



## ECLAMPSIA GROUP

Case no 3

Patient - Meena  
25yrs

- \* Primi Gravida
- \* Upper Socioeconomic Status
- \* Non Vegetarian
- \* C/o Convulsions for one day
- \* Paedal oedema present
- \* BP 170/100 mm Hg
- \* Urine - Protein present
- \* LFT Normal & RFT Impaired
- \* Developed renal failure
- \* Out come  $\Rightarrow$  F.T.N.D, male baby  
wt. 2.8 kg

Values mg%

	II	III	IP	24hrs	7th	30th
			period	PP	dPP	dPP
STC	-	170	190	180	-	-
STG	-	90	88	80	-	-
HDL	-	27	24	27	-	-
LDL	-	125	148.4	137	-	-
VLDL	-	18	17.6	16	-	-

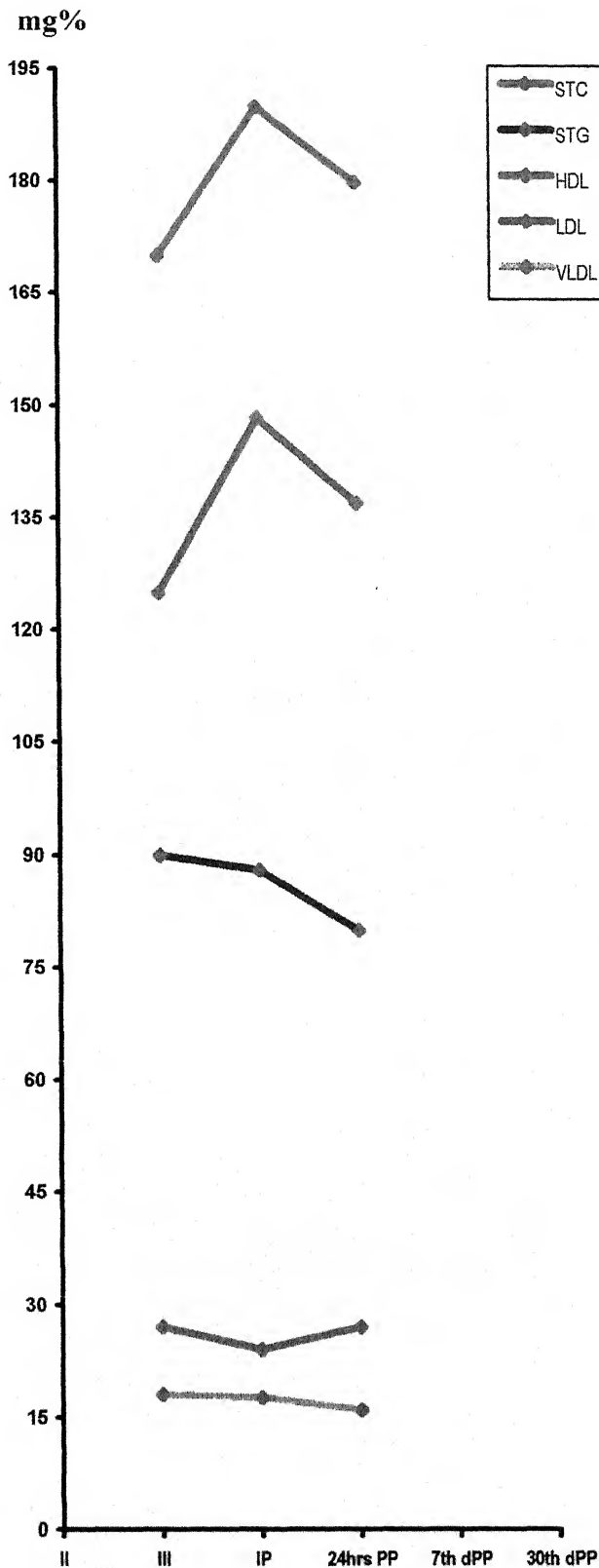
STC  $1\text{mmol/L} = 38.76\text{mg\%}$

STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$

HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

- \* 12%  $\uparrow$  in STC, maximum value during labour
- \* 6%  $\downarrow$  in STC, with in 24hrs PP
- \* 20%  $\uparrow$  in LDL, maximum value during labour
- \* 7%  $\downarrow$  in LDL, with in 24hrs PP
- \* 11%  $\downarrow$  in HDL, up to labour



## ECLAMPSIA GROUP

Case no 4

Patient - Hemwati

22yrs

- \* *Primi Gravida*
- \* *Middel Socioeconomic Status*
- \* *Vegetarian*
- \* *Unconscious during admission*
- \* *Paedal oedema present*
- \* *BP 140/96 mm Hg*
- \* *Urine - Protein present*
- \* *LFT Impaired & RFT Normal*
- \* *Out come  $\Rightarrow$  Spontaneous expulsion of premature male dead baby*

Values mg%

	II	III	IP period	24hrs PP	7th dPP	30th dPP
STC	-	278	300	290	270	-
STG	-	150	160	150	140	-
HDL	-	37	32	32	28	-
LDL	-	211	236	228	210	-
VLDL	-	30	32	30	28	-

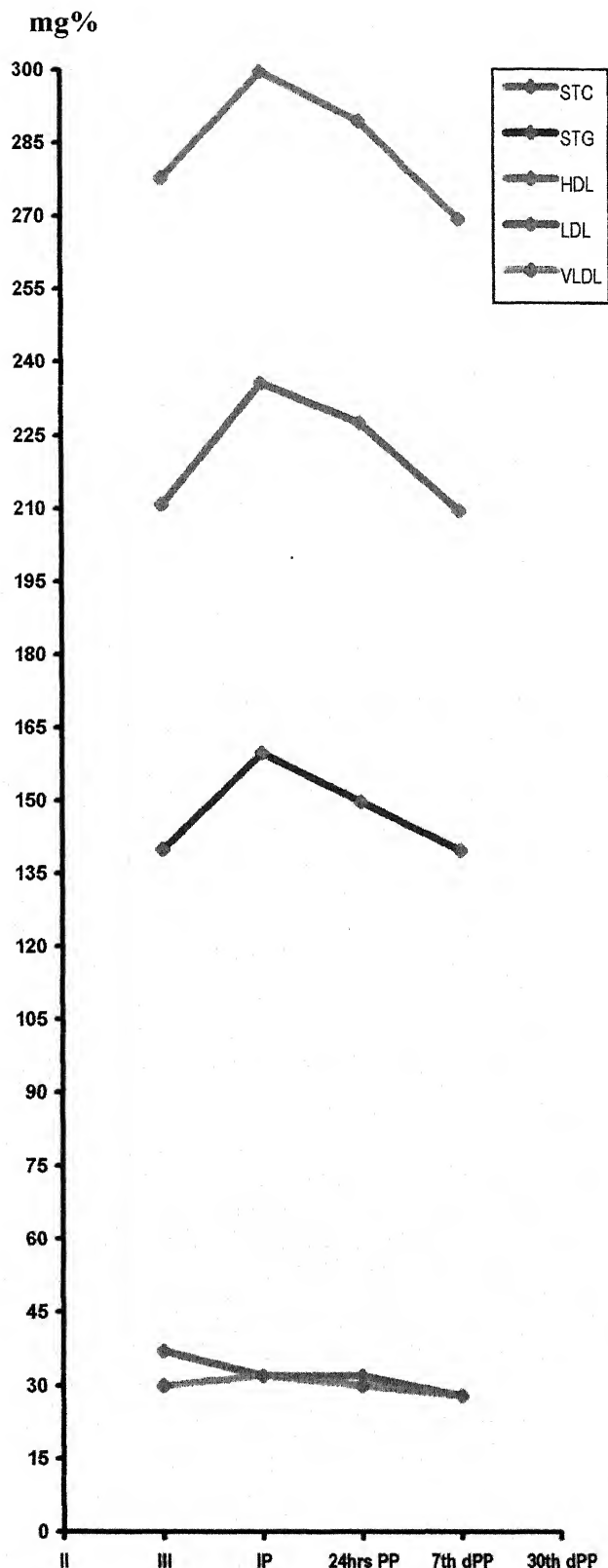
*STC 1mmol/L = 38.76mg%*

*STG mmol/L = mg% $\times$ 0.0114*

*HDL mmol/L = mg%/38.76*

### Legend :

- \* *8%  $\uparrow$  in STC, maximum value during labour*
- \* *3%  $\downarrow$  in STC, with in 24hrs PP*
- \* *12%  $\uparrow$  in LDL, maximum value during labour*
- \* *3%  $\downarrow$  in LDL, with in 24hrs PP*
- \* *13%  $\downarrow$  in HDL, up to labour*



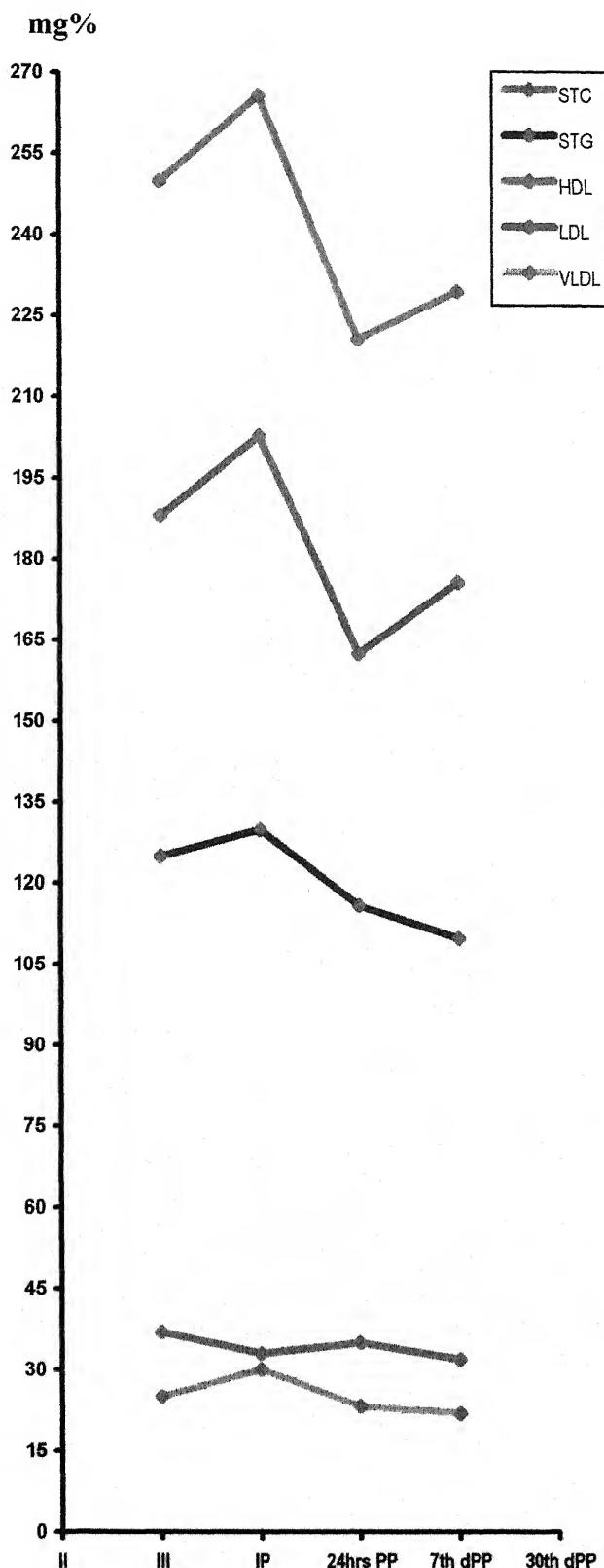


## ECLAMPSIA GROUP

Case no 5

Patient - Kashi bai  
25yrs

- \* G1P1L1
- \* Lower Socioeconomic Status
- \* Vegetarian
- \* Unconscious during admission
- \* Paedal oedema present
- \* BP 140/110 mm Hg
- \* Urine - Protein present
- \* LFT & RFT Normal
- \* Out come  $\Rightarrow$  F.T.N.D, female baby  
wt 2.7 kg



Values mg%

	II	III	IP	24hrs	7th	30th
			period	PP	dPP	dPP
STC	-	250	266	221	230	-
STG	-	125	130	116	110	-
HDL	-	37	33	35	32	-
LDL	-	188	203	162.8	176	-
VLDL	-	25	30	23.2	22	-

STC  $1\text{mmol/L} = 38.76\text{mg\%}$

STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$

HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

- \* 7%  $\uparrow$  in STC, maximum value during labour
- \* 17%  $\downarrow$  in STC, with in 24hrs PP
- \* 9%  $\uparrow$  in LDL, maximum value during labour
- \* 20%  $\downarrow$  in LDL, with in 24hrs PP
- \* 11%  $\downarrow$  in HDL, up to labour

## ECLAMPSIA GROUP

Case no 6

Patient - Gomti  
25yrs

- \* G3P3L3
- \* Lower Socioeconomic Status
- \* Vegetarian
- \* C/o Convulsions for 2 days
- \* Paedal oedema present
- \* BP 140/110 mm Hg
- \* Urine - Protein present
- \* LFT & RFT Normal
- \* Out come  $\Rightarrow$  Premature Vaginal delivery female baby

wt 2.5 kg

Values mg%

	II	III	IP	24hrs	7th	30th
			period	PP	dPP	dPP
STC	-	192	200	-	180	170
STG	-	91	84	-	80	78
HDL	-	36	32	-	34	32
LDL	-	150.8	151.2	-	130	122.4
VLDL	-	18.2	16.8	-	16	15.6

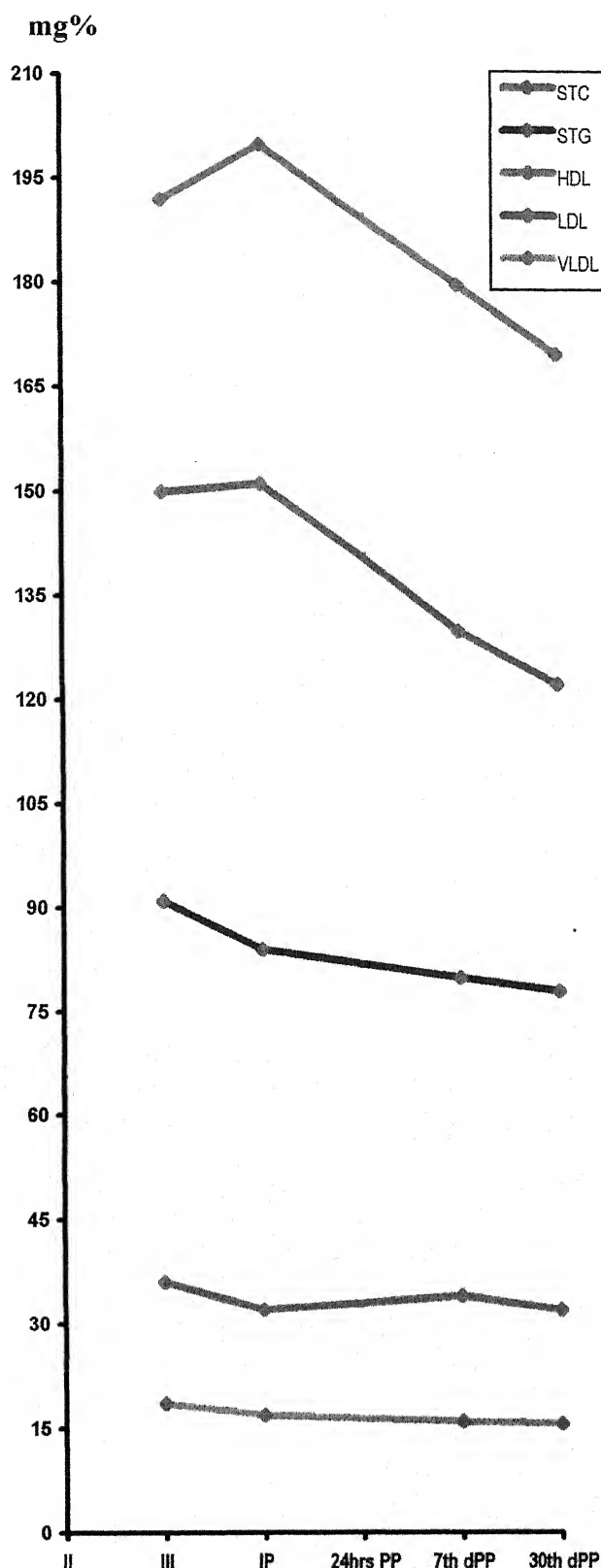
STC 1mmol/L = 38.76mg%

STG mmol/L = mg% $\times$ 0.0114

HDL mmol/L = mg%/38.76

### Legend :

- \* 5%  $\uparrow$  in STC, maximum value during labour
- \* minimal  $\uparrow$  in LDL, maximum value during labour
- \* 10%  $\downarrow$  in HDL, up to labour

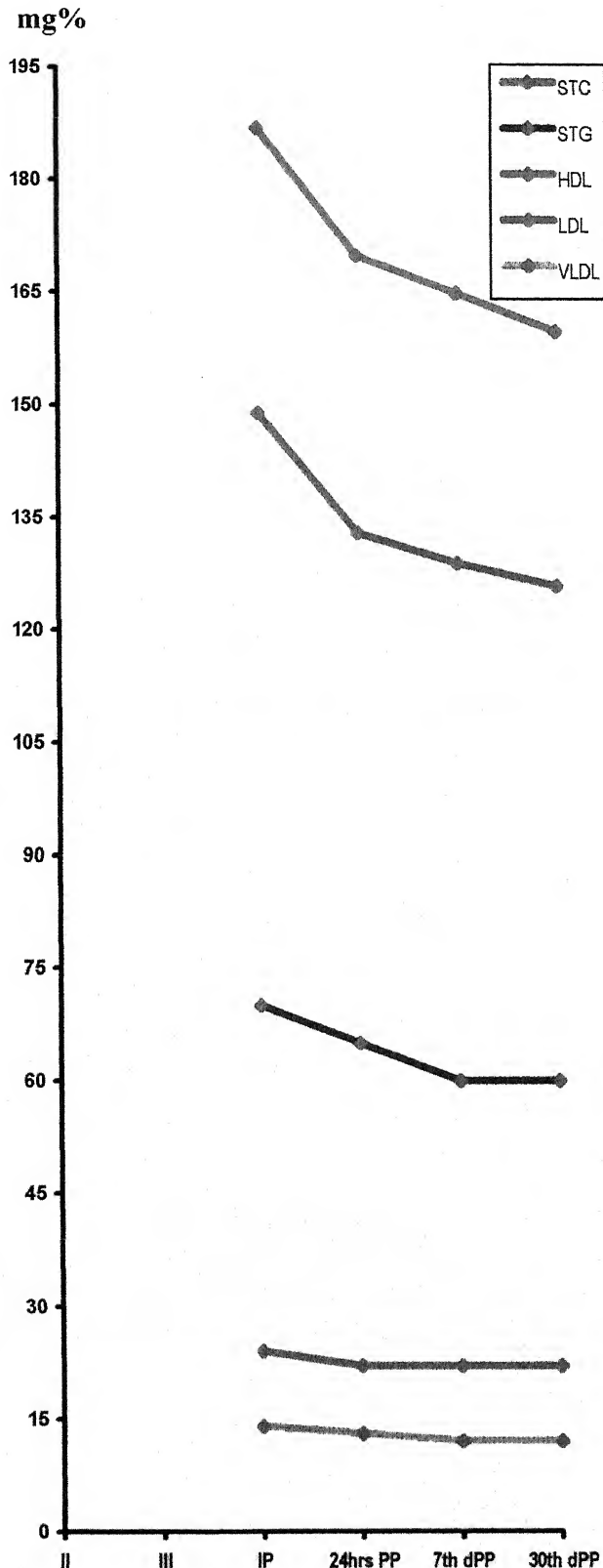


## ECLAMPSIA GROUP

Case no 7

Patient - Mala  
23yrs

- \* Primi Gravida
- \* Middle Socioeconomic Status
- \* Vegetarian
- \* C/o Swelling over feet & convulsions
- \* Paedal oedema present
- \* BP 160/110 mm Hg
- \* Urine - Protein present
- \* LFT & RFT Normal
- \* Out come  $\Rightarrow$  F.T.N.D, female baby  
wt 2.4 kg



Values mg%

	II	III	IP	24hrs	7th	30th
			period	PP	dPP	dPP
STC	-	-	187	170	165	160
STG	-	-	70	65	60	60
HDL	-	-	24	22	22	22
LDL	-	-	149	133	129	126
VLDL	-	-	14	13	12	12

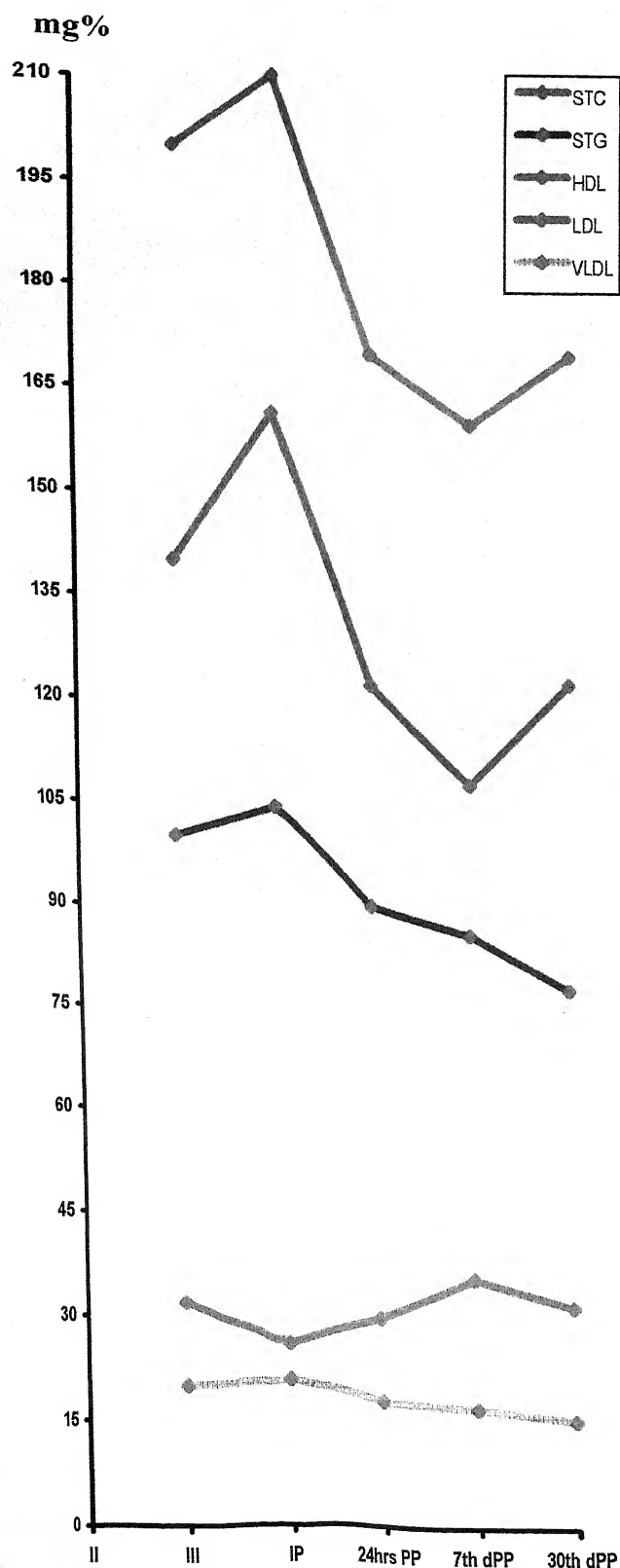
STC  $1\text{mmol/L} = 38.76\text{mg\%}$

STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$

HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

- \* 9%  $\downarrow$  in STC, with in 24hrs PP
- \* 15%  $\downarrow$  in LDL, with in 24hrs PP
- \* 10%  $\downarrow$  in HDL, up to labour



## ECLAMPSIA GROUP

Case no 8

Patient - Geeta  
18yrs

- \* *Primi Gravida*
- \* *Middle Socioeconomic Status*
- \* *Vegetarian*
- \* *C/o Convulsions for 2 days & Blurring of Vision*
- \* *BP 140/100 mm Hg*
- \* *Urine - Protein present*
- \* *LFT & RFT Normal*
- \* *Out come  $\Rightarrow$  Forceps delivery of female baby by Vertex, wt 2.8 kg*

	Values mg%					
	II	III	IP	24hrs PP	7th dPP	30th dPP
STC	-	200	210	170	160	-
STG	-	100	104	90	86	-
HDL	-	32	26	30	36	-
LDL	-	148	161.8	122	107.8	-
VLDL	-	20	20.8	18	17.2	-

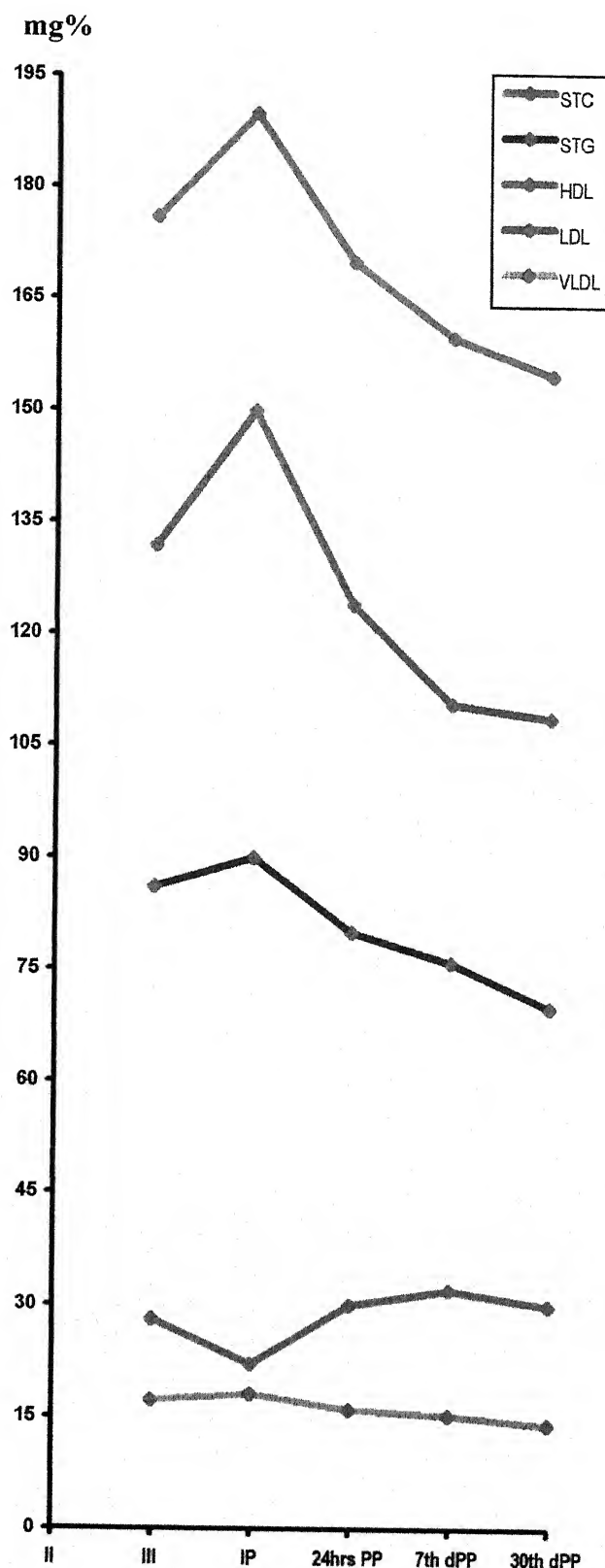
STC  $1\text{mmol/L} = 38.76\text{mg\%}$

STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$

HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

- \* *5%  $\uparrow$  in STC, maximum value during labour*
- \* *20%  $\downarrow$  in STC, with in 24hrs PP*
- \* *9%  $\uparrow$  in LDL, maximum value during labour*
- \* *21%  $\downarrow$  in LDL, with in 24hrs PP*
- \* *18%  $\downarrow$  in HDL, up to labour*



## ECLAMPSIA GROUP

Case no 9

Patient - Rajkumari  
25yrs

- \* G2P1L1
- \* Middle Socioeconomic Status
- \* Non Vegetarian
- \* C/o Convulsions for one day
- \* Paedal oedema present
- \* BP 160/120 mm Hg
- \* Urine - Protein present
- \* LFT & RFT Normal
- \* Out come  $\Rightarrow$  premature Vaginal delivery female baby, wt 2.0 kg

Values mg%

	II	III	IP	24hrs	7th	30th
			period	PP	dPP	dPP
STC	-	176	190	170	160	155
STG	-	86	90	80	76	70
HDL	-	28	22	30	32	30
LDL	-	131.8	150	124	110.8	101
VLDL	-	17.2	18	16	15.2	14

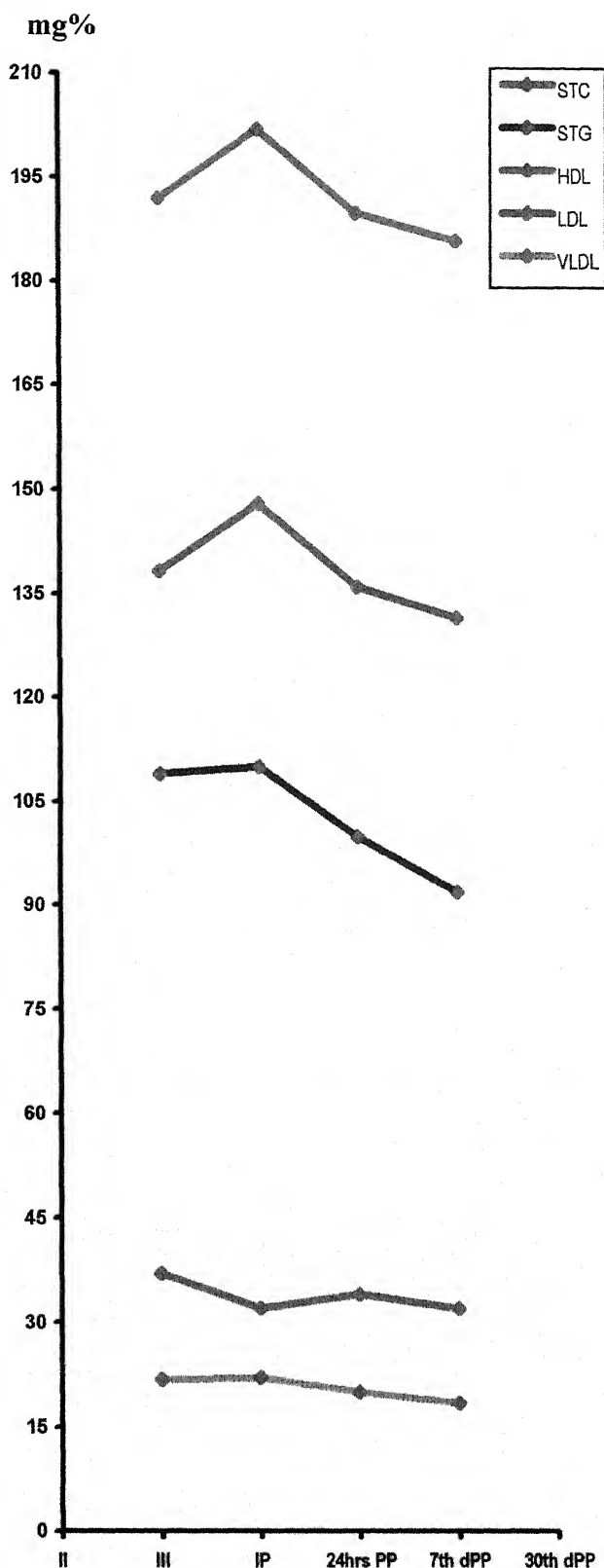
STC  $1\text{mmol/L} = 38.76\text{mg\%}$

STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$

HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

- \* 8%  $\uparrow$  in STC , maximum value during labour
- \* 12%  $\downarrow$  in STC , with in 24hrs PP
- \* 17%  $\uparrow$  in LDL, maximum value during labour
- \* 18%  $\downarrow$  in LDL , with in 24hrs PP
- \* 27%  $\downarrow$  in HDL , up to labour



## ECLAMPSIA GROUP

Case no 10

Patient - Susheela  
26yrs

- \* G3P3L3
- \* Lower Socioeconomic Status
- \* Vegetarian
- \* C/o Swelling over feet & convulsions one day back
- \* BP 190/100 mm Hg
- \* Urine - Protein present
- \* LFT & RFT Normal
- \* Out come  $\Rightarrow$  F.T.N.D, female baby  
wt 2.8 kg

		Values mg%				
	II	III	IP	24hrs PP	7th dPP	30th dPP
STC	-	192	202	190	186	-
STG	-	109	110	100	92	-
HDL	-	37	32	34	32	-
LDL	-	138.2	148	136	131.6	-
VLDL	-	21.8	22	20	18.4	-

STC  $1\text{mmol/L} = 38.76\text{mg\%}$

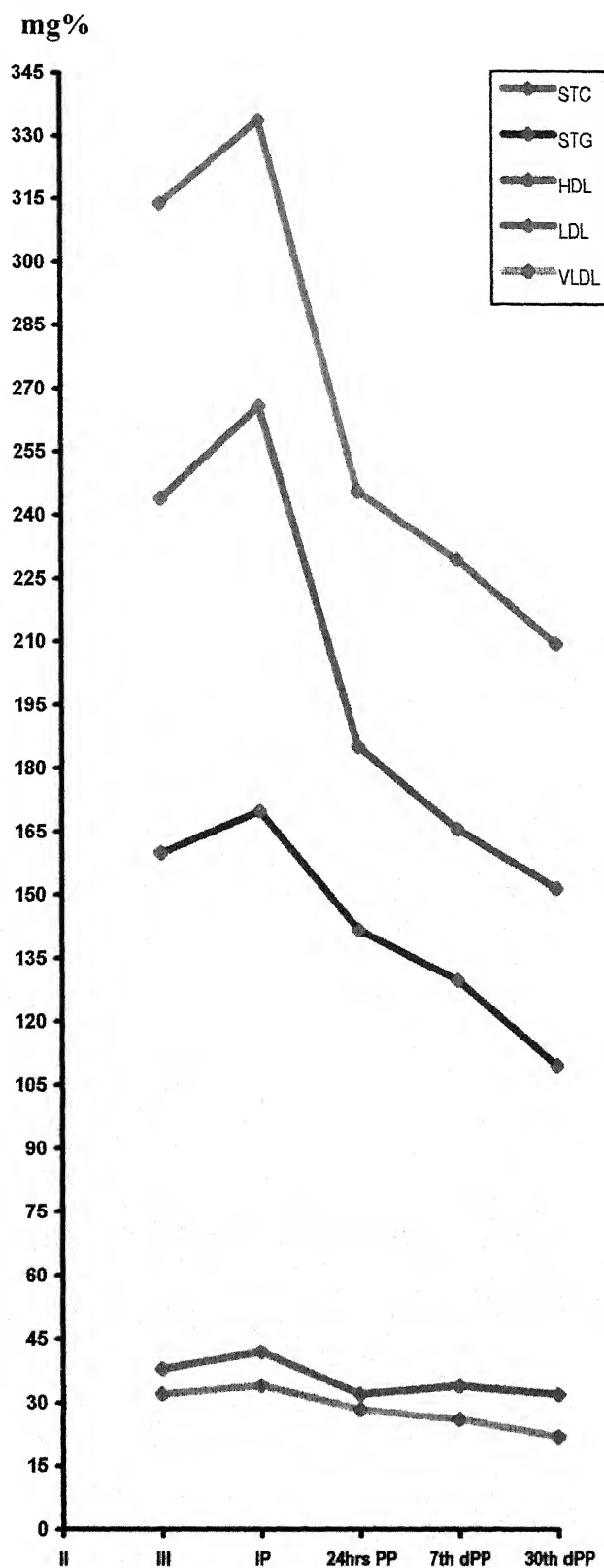
STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$

HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

- \* 6%  $\uparrow$  in STC, maximum value during labour
- \* 7%  $\downarrow$  in STC, with in 24hrs PP
- \* 8%  $\uparrow$  in LDL, maximum value during labour
- \* 9%  $\downarrow$  in LDL, with in 24hrs PP
- \* 11%  $\downarrow$  in HDL, up to labour





## ECLAMPSIA GROUP

Case no 11

Patient - Madhu  
18yrs

- \* Primi Gravida
- \* Upper Socioeconomic Status
- \* Non Vegetarian
- \* C/o Unconscious during admission
- \* Paedal oedema present
- \* BP 160/110 mm Hg
- \* Urine - Protein present
- \* LFT Normal & RFT Impaired
- \* Deveolped renal failure
- \* Out come  $\Rightarrow$  Spontaneous expulsions of dead male baby

		Values mg%				
	II	III	IP	24hrs PP	7th dPP	30th dPP
STC	-	314	334	246	230	210
STG	-	160	170	142	130	110
HDL	-	38	34	32	34	32
LDL	-	244	266	185.6	166	152
VLDL	-	32	34	28.4	26	22

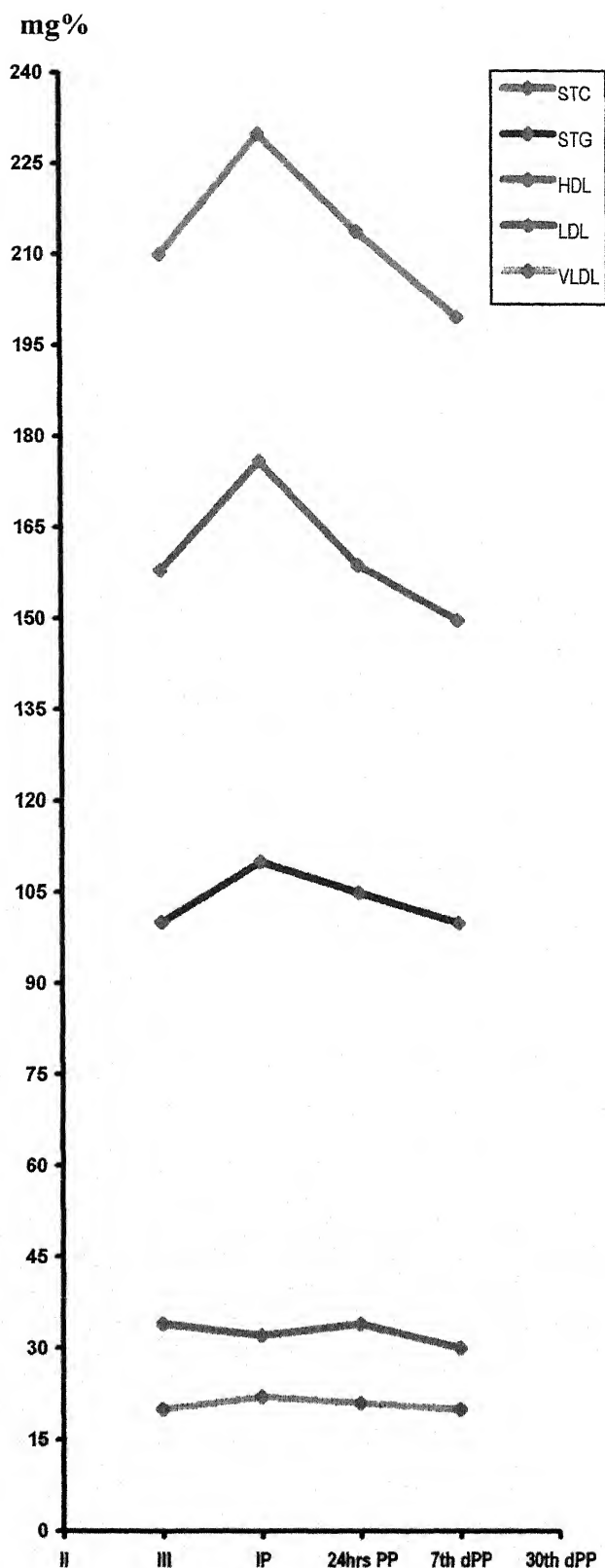
STC  $1\text{mmol/L} = 38.76\text{mg\%}$

STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$

HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

- \*  $8\% \uparrow$  in STC , maximum value during labour
- \*  $27\% \downarrow$  in STC ,with in 24hrs PP
- \*  $7\% \uparrow$  in LDL, maximum value during labour
- \*  $30\% \downarrow$  in LDL , with in 24hrs PP
- \*  $10\% \downarrow$  in HDL , up to labour



## ECLAMPSIA GROUP

Case no 12

Patient - Pawan Kumari  
21yrs

- \* Primi Gravida
- \* lower Socioeconomic Status
- \* Vegetarian
- \* C/o Unconscious during admission
- \* Paedal oedema present
- \* BP 148/96 mm Hg
- \* Urine - Protein present
- \* LFT Normal & RFT Impaired
- \* Deveolped renal failure
- \* Out come  $\Rightarrow$  F.T.N.D, female baby  
wt. 2.4 kg

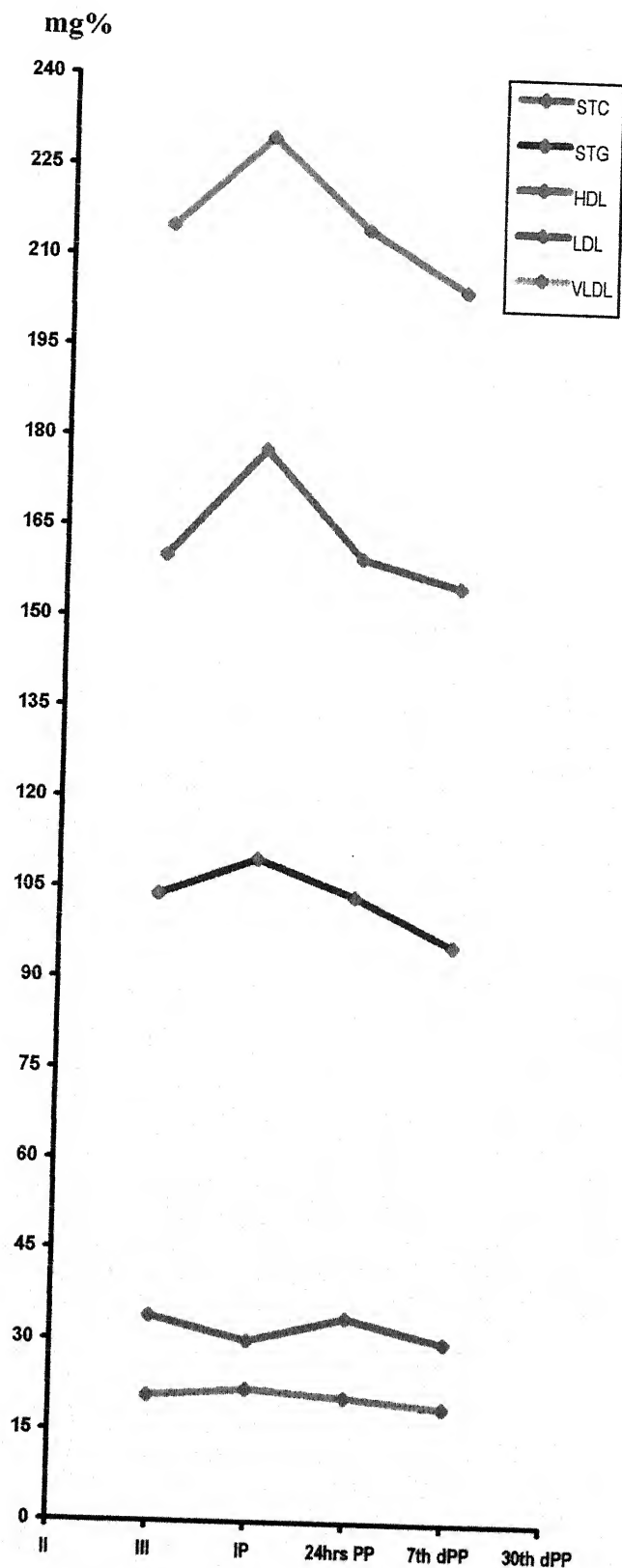
	II	III	IP	24hrs	7th	30th
			period	PP	dPP	dPP
STC	-	210	230	214	200	-
STG	-	100	110	105	100	-
HDL	-	34	32	34	30	-
LDL	-	158	176	159	150	-
VLDL	-	20	22	21	20	-

STC 1mmol/L = 38.76mg%  
STG mmol/L = mg% $\times$ 0.0114  
HDL mmol/L = mg%/38.76

### Legend :

- \* 10%  $\uparrow$  in STC , peak during labour
- \* 7%  $\downarrow$  in STC ,with in 24hrs PP
- \* 14%  $\uparrow$  in LDL, peak during labour
- \* 10%  $\downarrow$  in LDL , with in 24hrs PP
- \* 5%  $\downarrow$  in HDL , up to labour





## ECLAMPSIA GROUP

Case no 13

Patient - Raj kumari  
26yrs

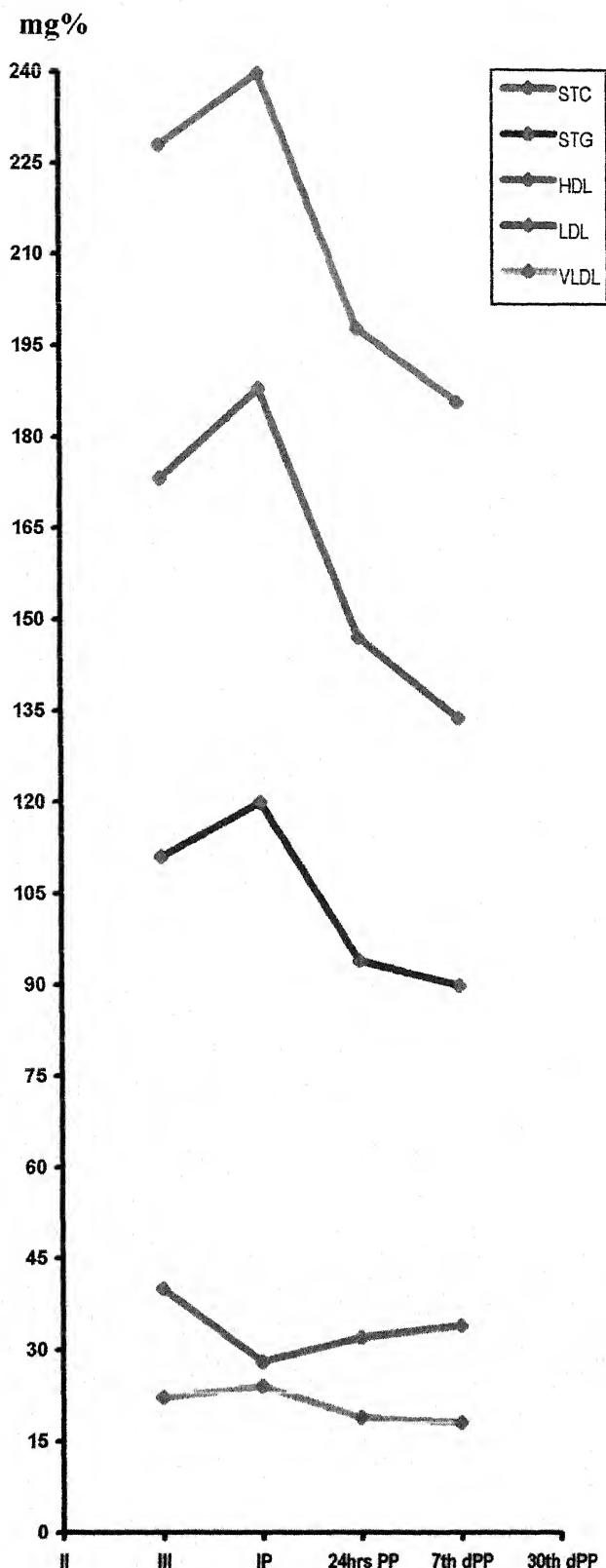
- \* G2P2L2
- \* Lower Socioeconomic Status
- \* Vegetarian
- \* C/o Convulsious for one day
- \* Paedal oedema present
- \* BP 160/96 mm Hg
- \* Urine - Protein present
- \* LFT & RFT Normal
- \* Out come  $\Rightarrow$  F.T.N.D, female baby  
wt 2.7 kg

		Values mg%				
	II	III	IP	24hrs	7th	30th
			period	PP	dPP	dPP
STC	-	215	230	215	205	-
STG	-	104	110	104	96	-
HDL	-	34	30	34	30	-
LDL	-	160.2	178	160.2	147.8	-
VLDL	-	20.8	22	20.8	19.2	-

STC 1mmol/L = 38.76mg%  
STG mmol/L = mg% $\times$ 0.0114  
HDL mmol/L = mg%/38.76

### Legend :

- \* 7%  $\uparrow$  in STC , peak during labour
- \* 6%  $\downarrow$  in STC , with in 24hrs PP
- \* 12%  $\uparrow$  in LDL, peak during labour
- \* 12%  $\downarrow$  in LDL , with in 24hrs PP
- \* 11%  $\downarrow$  in HDL , up to labour



## ECLAMPSIA GROUP

Case no 14

Patient - Kunwar bai  
20yrs

- \* Primi Gravida
- \* Lower Socioeconomic Status
- \* Vegetarian
- \* C/o Unconscious during admission
- \* Paedal oedema present
- \* BP 180/100 mm Hg
- \* Urine - Protein present
- \* LFT & RFT Normal
- \* Out come  $\Rightarrow$  Forcep delivery of still female baby

	II	III	IP	24hrs PP	7th dPP	30th dPP
			period			
STC	-	228	240	198	186	-
STG	-	111	120	94	90	-
HDL	-	32	28	32	34	-
LDL	-	173.2	188	147.2	134	-
VLDL	-	22.2	24	18.8	18	-

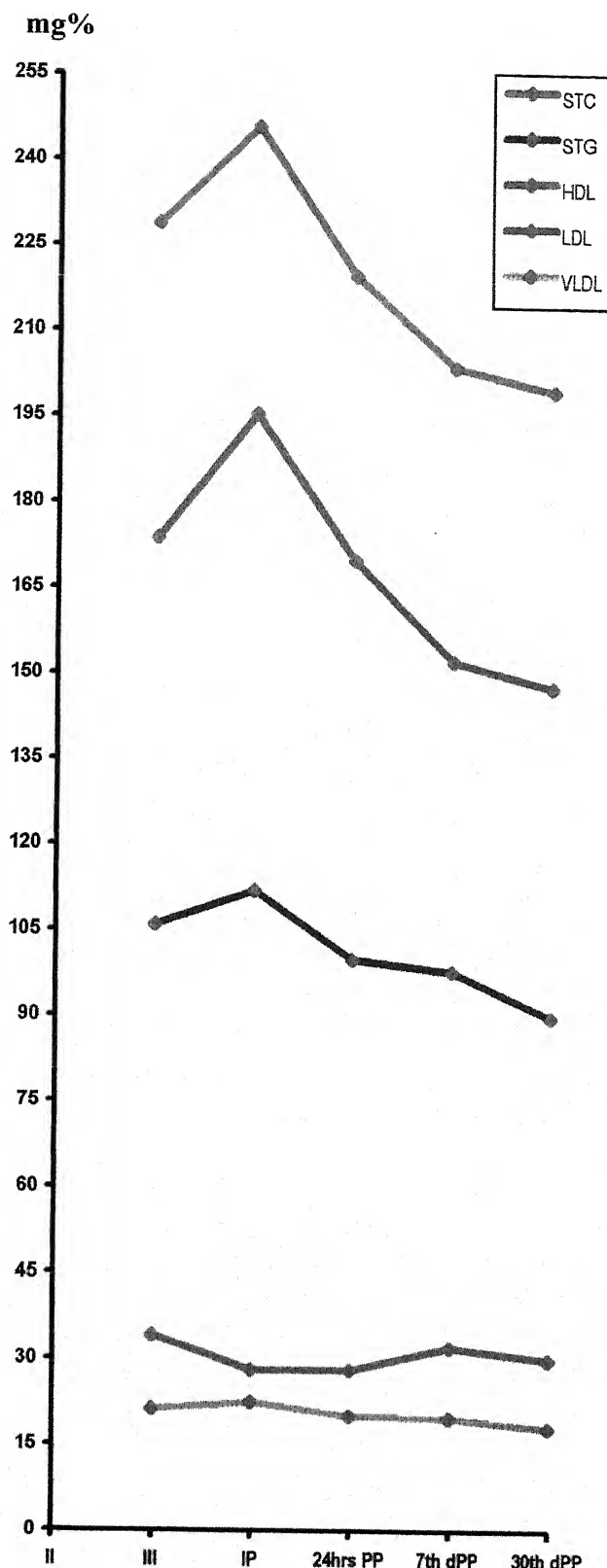
STC  $1\text{mmol/L} = 38.76\text{mg\%}$

STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$

HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

- \* 7%  $\uparrow$  in STC , peak during labour
- \* 20%  $\downarrow$  in STC , with in 24hrs PP
- \* 9%  $\uparrow$  in LDL, peak during labour
- \* 22%  $\downarrow$  in LDL , with in 24hrs PP
- \* 12%  $\downarrow$  in HDL , up to labour



## ECLAMPSIA GROUP

Case no 15

Patient - Angoori  
24yrs

- \* Primi Gravida
- \* Lower Socioeconomic Status
- \* Vegetarian
- \* C/o Convulsious for one day
- \* Oedema over feet present
- \* BP 150/100 mm Hg
- \* Urine - Protein present
- \* LFT Impaired & RFT Normal
- \* Out come  $\Rightarrow$  Spontaneous expulsion of full term dead male foetus

Values mg%

	II	III	IP	24hrs	7th	30th
			period	PP	dPP	dPP
STC	-	229	246	220	204	200
STG	-	106	112	100	98	90
HDL	-	34	28	28	32	30
LDL	-	173.8	195.6	170	152.4	148
VLDL	-	21.2	22.4	20	19.6	18

STC  $1\text{mmol/L} = 38.76\text{mg\%}$

STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$

HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

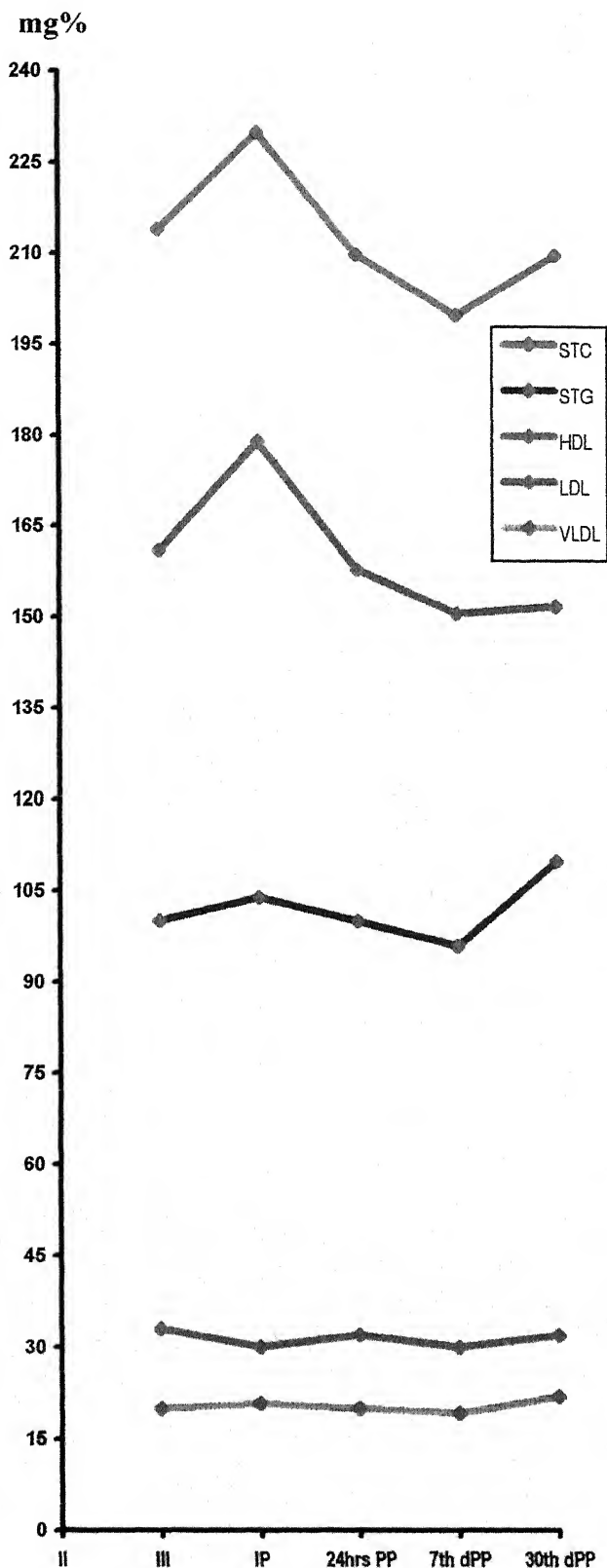
- \*  $8\% \uparrow$  in STC , peak during labour
- \*  $11\% \downarrow$  in STC , with in 24hrs PP
- \*  $12\% \uparrow$  in LDL, peak during labour
- \*  $14\% \downarrow$  in LDL , with in 24hrs PP
- \*  $17\% \downarrow$  in HDL , up to labour

## ECLAMPSIA GROUP

Case no 16

Patient - Jareena  
21yrs

- \* Primi Gravida
- \* Lower Socioeconomic Status
- \* Non Vegetarian
- \* C/o Convulsions for six hrs
- \* Paedal oedema absent
- \* BP 140/100 mm Hg
- \* Urine - **Protein present**
- \* LFT Normal & RFT Impaired
- \* Develooped renal failure
- \* Out come  $\Rightarrow$  F.T.N.D, female baby  
wt.2.6 kg



		Values mg%				
	II	III	IP	24hrs	7th	30th
			period	PP	dPP	dPP
STC	-	214	230	210	200	-
STG	-	100	104	100	96	-
HDL	-	33	30	32	30	-
LDL	-	161	179	158	150.8	-
VLDL	-	20	20.8	20	19.2	-

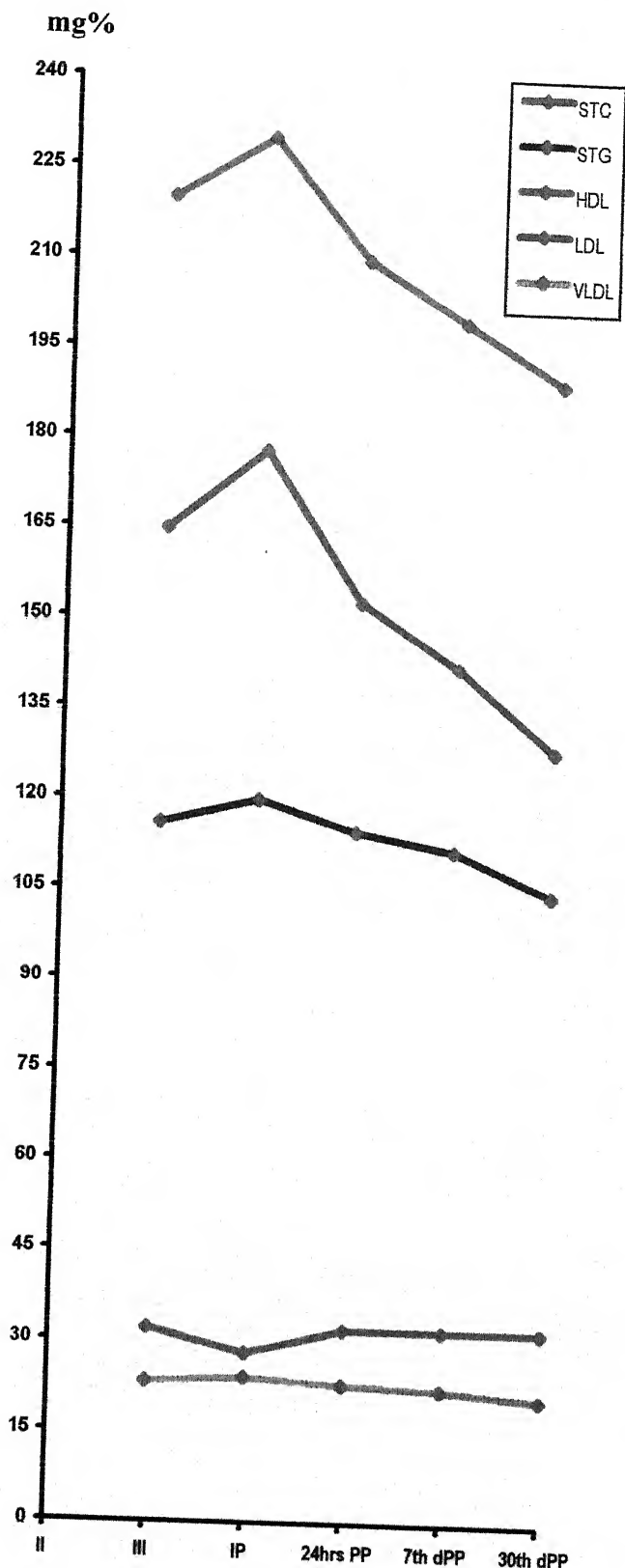
STC  $1\text{mmol/L} = 38.76\text{mg\%}$

STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$

HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

- \* 7.5%  $\uparrow$  in STC , maximum value during labour
- \* 9%  $\downarrow$  in STC , with in 24hrs PP
- \* 11%  $\uparrow$  in LDL , maximum value during labour
- \* 12%  $\downarrow$  in LDL , with in 24hrs PP
- \* 9%  $\downarrow$  in HDL , up to labour



## ECLAMPSIA GROUP

Case no 17

Patient - Premwati  
26yrs

- \* Primi Gravida
- \* Middle Socioeconomic Status
- \* Vegetarian
- \* C/o Unconscious during admission
- \* BP 150/106 mm Hg
- \* Urine - Protein present
- \* LFT Normal & RFT Impaired
- \* Outcome  $\Rightarrow$  F.T.N.D, male baby

wt 2.4 kg

	II	III	IP	24hrs PP	7th dPP	30th dPP
STC	-	220	230	210	200	190
STG	-	116	120	115	112	105
HDL	-	32	28	32	32	32
LDL	-	164.8	178	153	142.6	129
VLDL	-	23.2	24	23	22.4	21

STC  $1\text{mmol/L} = 38.76\text{mg\%}$

STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$

HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

- \* 5%  $\uparrow$  in STC , peak during labour
- \* 9%  $\downarrow$  in STC , with in 24hrs PP
- \* 10%  $\uparrow$  in LDL, peak during labour
- \* 12%  $\downarrow$  in LDL , with in 24hrs PP
- \* 12%  $\downarrow$  in HDL , up to labour

**TABLE VIII**

**Showing serum lipoprotein profile in eclamptic patients with still birth**

	IInd trimester	IIIrd trimester	IP period	1st post partum day	7th post partum day	30th post partum day
STC mg % Mean $\pm$ SD	---	251.8 $\pm$ 42.78	278.0 $\pm$ 39.2	236.8 $\pm$ 34.45	222.0 $\pm$ 31.59	205 $\pm$ 7.0
STG mg % Mean $\pm$ SD	---	1.31.2 $\pm$ 23.59	142.4 $\pm$ 25.27	118.8 $\pm$ 20.67	113.5 $\pm$ 22.24	100 $\pm$ 14.14
HDL mg % Mean $\pm$ SD	---	33.6 $\pm$ 4.5	28.8 $\pm$ 4.6	30 $\pm$ 5.16	30 $\pm$ 5.09	31 $\pm$ 4.1
LDL mg % mean $\pm$ SD	---	192.8 $\pm$ 58.72	220 $\pm$ 31.72	183 $\pm$ 29.51	173.6 $\pm$ 31.09	150 $\pm$ 10
VLDL mg % mean $\pm$ SD	---	26.2 $\pm$ 4.72	28.4 $\pm$ 6.81	24.4 $\pm$ 4.72	22.6 $\pm$ 5.02	20 $\pm$ 2.8
no of cases (n)	---	5	5	5	5	2

Table VIII shows that STC raised from 251.8  $\pm$  42.78 at 3rd trimester to 278  $\pm$  39.2 at IP period and then declined to 236.8  $\pm$  34.45 at 1st PP day and 222.0  $\pm$  31.59 at 7th PP day reaching to 205  $\pm$  7 at 30th PP day

III VS IP  $p < .05$

IP Vs 1st PP day  $p < .05$

IP Vs 7th PP day  $p < .001$

Similarly LDL raised from 192.8  $\pm$  58.72 to 220  $\pm$  31.72 at IP period which declined to 183 at 1st PP day and 173.6  $\pm$  31.09 at 7th PP day

III Vs IP  $p < .001$

IP Vs 1st PP day  $p < .001$

IP Vs 7th PP day  $p < .001$

HDL decreased from 33.6  $\pm$  4.3 to 28.8  $\pm$  4.6 at labour then raised to 31  $\pm$  1 at 30th PP day

III Vs IP  $p < .001$

IP Vs 1st PP day  $p > .05$

IP Vs 7th PP day  $p > .05$

STG and VLDL raised from IIIrd trimester and reached to peak during labour , declined afterwards



**TABLE IX****Serum Lipoprotein profile in relation to parity in cases of eclampsia**

	Parity	II trimester	III trimester	IP period	24 hrs PP	7th day PP	30th day PP
STC mg % mean±SD	Primi	-	228.5± 40.36	239± 43.71	210.9± 34.93	202± 31.3	190± 21.6
	Multi	-	205.8± 34.05	226.33± 35.03	205.2± 24.5	196.66± 26.62	162± 20.2
LDL mg % mean±SD	Primi	-	172.4± 34	186.72± 35.03	159.63± 29.66	149.3± 26	138.75± 46.74
	Multi	-	154.16± 19.8	174.6± 30.2	153.4± 23.66	146.5± 26.73	115.5± 9.2
HDL mg % mean±SD	Primi	-	33.1± 3.03	28.9± 9.64	30.7± 3.32	31± 11.7	29± 4.76
	Multi	-	34.33± 4.35	28.5± 5.15	31.4± 4.58	30.33± 4.28	31± 1.4
no of Cases	Primi	-	10	11	11	10	4
	Multi	-	6	6	5	6	2

Table IX shows that values of mean STC & mean LDL were higher during pregnancy, Labour and on 1st, 7th and 30th PP day in Primi Gravidae. In comparison to Multi Gravidae. But this difference was statistically not significant. HDL values were higher in Multi Gravidae during 3rd trimester and on 1st PP day and 30th PP day.

**TABLE X****Serum Lipoproteins in eclamptic patients with un consciousness**

	II trimester	III trimester	IP period	24 hrs PP	7th day PP	30th day PP
STC mg % mean ± SD	-	244.2± 40.21	267± 36.2	230± 32.2	220± 31.8	200± 10.1
STG mg % mean ± SD	-	127.14± 23.27	137.14± 25.2	118.71± 21.2	112.85± 19.28	107.5± 16.2
HDL mg % mean ± SD	-	33.85± 4.2	29.42± 4.4	31.37± 4.1	33.14± 4.1	32± 2.1
LDL mg % mean ± SD	-	184.85± 42.6	208.7± 36.71	174.7± 30.8	165± 31.2	140± 7.8
VLDL mg % mean ± SD	-	26.14± 4.82	28± 6.2	23.85± 6.21	24± 4.71	21.5± 3.2
no of Cases	-	7	7	7	7	2



Table X shows that STC value was  $244.2 \pm 40.21$  during III trimester then raised to  $267 \pm 36.2$  during labour and declined to  $230 \pm 32.2$  at 1st PP day .  $220 \pm 31.8$  at 7th PP day reaching to  $200 \pm 10.1$  at 30th post partum day.

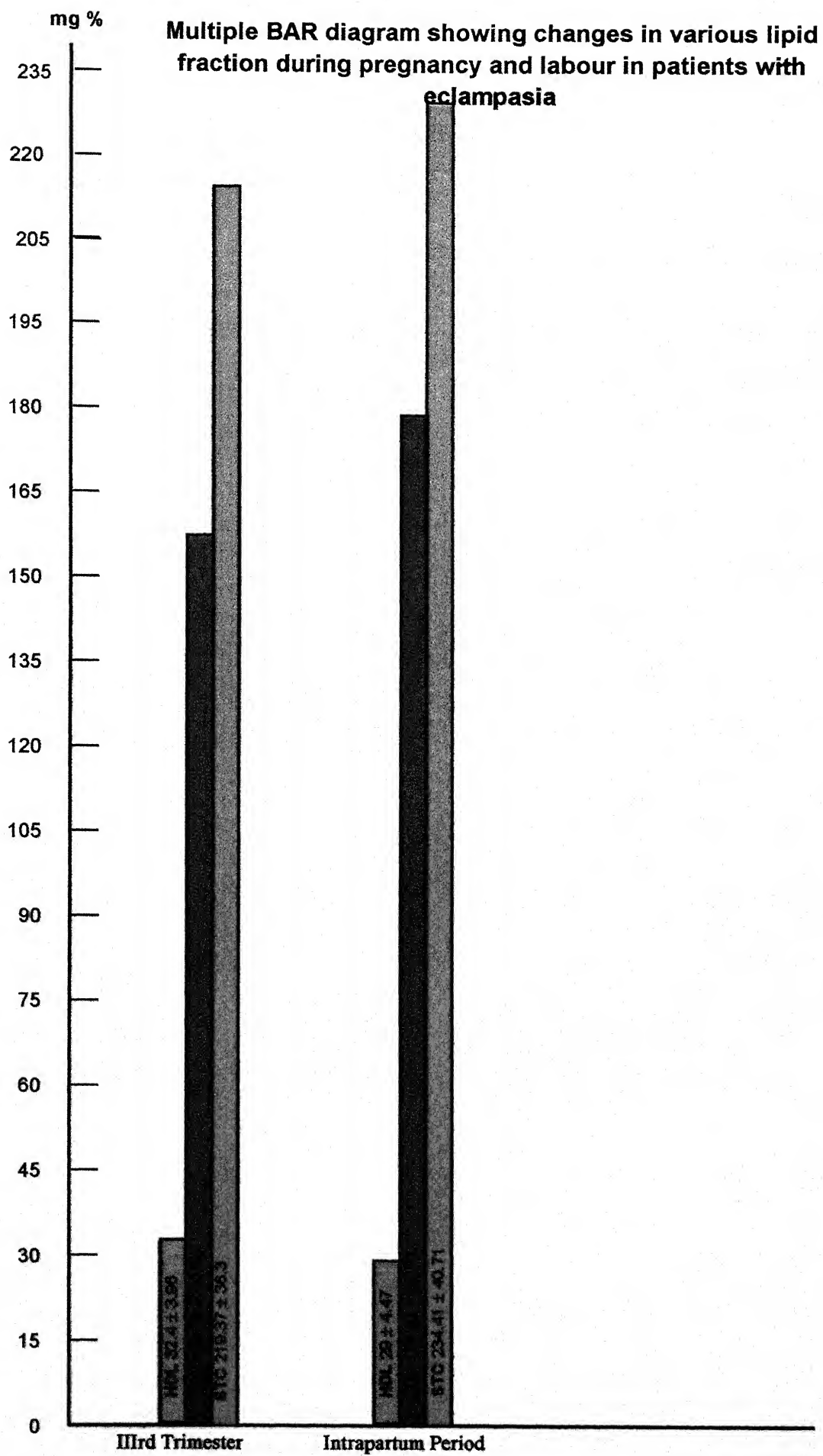
III Vs IP	$p < .001$
III Vs 1st PP day	$P < .001$
III Vs 7th PP day	$p < .001$
1st PP day Vs 7th Pp day	$p < .001$

LDL raised from  $184.85 \pm 42.6$  to  $208.7 \pm 36.71$  at labour , then decreased to  $140.0 \pm 7.8$  at 30th PP day.

III Vs IP	$p < .05$
IP Vs 1st PP day	$p < .001$
IP Vs 7th PP day	$p < .001$

HDL declined from  $33.85 \pm 4.2$  to  $29.42 \pm 4.4$  at labour , then raised to  $33.14 \pm 4.1$  mg% at 7th PP day .

III Vs IP	$p < .001$
IP Vs 1st PP day	$p > .05$
IP Vs 7th PP day	$p < .001$



**TABLE XI****Serum Lipoprotein Profile in cases of IUGR.**

	II trimester	III trimester	IP period	24 hrs PP	7th day PP	30th day PP
STC mg % mean $\pm$ SD	168.44 $\pm$ 7.95	171.5 $\pm$ 9	176.9 $\pm$ 9.59	172.3 $\pm$ 9.2	168.6 $\pm$ 11.2	165.8 $\pm$ 10.83
STG mg % mean $\pm$ SD	87.88 $\pm$ 4.13	93 $\pm$ 6.23	97.2 $\pm$ 7.1	92.7 $\pm$ 5.62	89.6 $\pm$ 6.0	91 $\pm$ 4.29
HDLmg % mean $\pm$ SD	37.33 $\pm$ 1.9	33.9 $\pm$ 1.76	31.8 $\pm$ 1.94	32.4 $\pm$ 2.24	32.9 $\pm$ 2.86	32.83 $\pm$ 3.36
LDL mg % mean $\pm$ SD	113.53 $\pm$ 8	119 $\pm$ 8.6	125.4 $\pm$ 8.77	121.2 $\pm$ 8.24	117.8 $\pm$ 7.24	113 $\pm$ 9.83
VLDL mg % mean $\pm$ SD	17.52 $\pm$ 2.5	18.6 $\pm$ 2.4	19.44 $\pm$ 2.13	18.52 $\pm$ 2.2	17.9 $\pm$ 1.78	18.2 $\pm$ 2.6
no of Cases	9	10	10	10	10	6

Table XI shows that STC at 2nd trimester was  $168.44 \pm 7.95$ , it raised minimally to  $176.9 \pm 9.59$  during labour, rise was statistically not significantly, then it decreased to  $165.63 \pm 10.83$  at 30th PP day

III Vs IP  $p > .05$   
 II Vs IP  $p > .05$   
 II Vs III  $p > .05$   
 IP Vs 1st PP day  $p > .05$   
 IP Vs 7th PP day  $P > .05$   
 IP Vs 30th PP day  $p > .05$

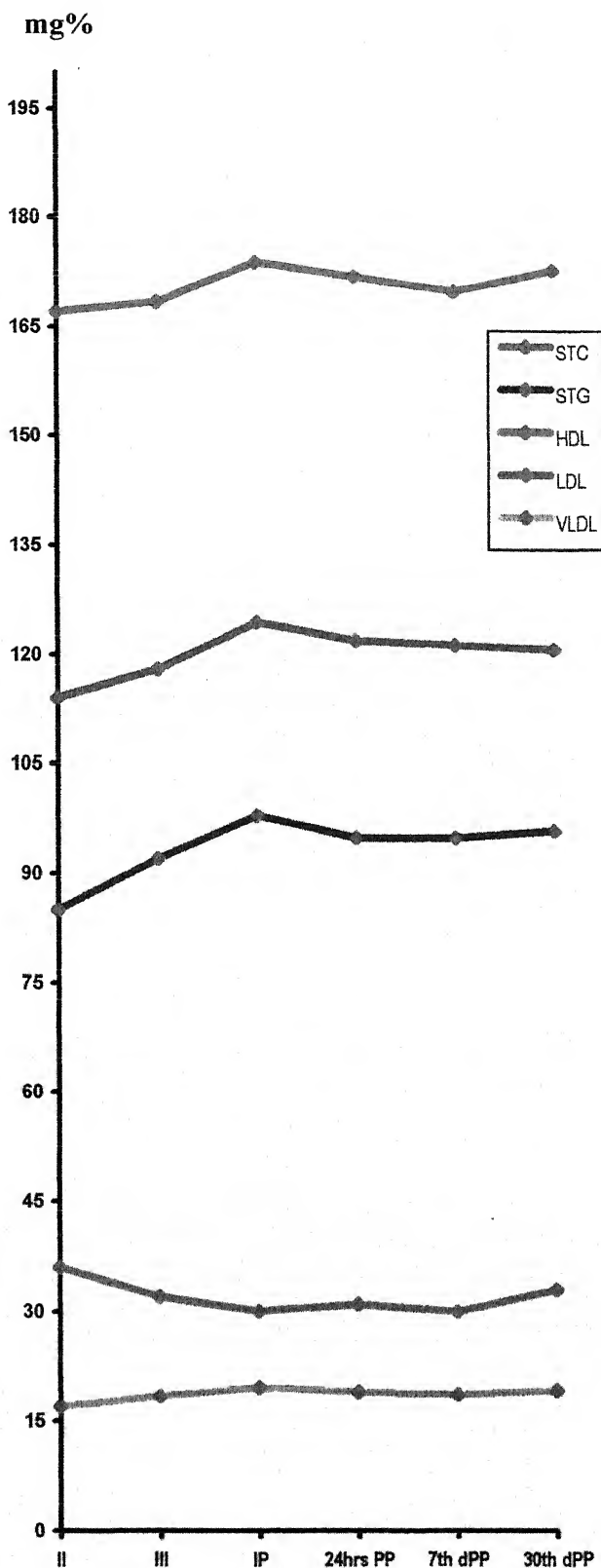
LDL raised minimally from 2nd trimester ( $113.5 \pm 8.0$ ) to  $119.0 \pm 8.67$  at 3rd trimester and  $125.4 \pm 8.77$  during labour, it decreased to  $121.2 \pm 8.24$  on 1st PP day,  $117.8 \pm 7.24$  mg % on day 7th

II Vs III  $p > .05$   
 III Vs IP  $p > .05$   
 II Vs IP  $p > .05$   
 IP Vs 1st PP day  $p > .05$   
 IP Vs 7th PP day  $p > .05$   
 IP Vs 30 th PP day  $p > .05$

HDL declined from  $37.35 \pm 1.9$  to  $33.9 \pm 1.76$  from 2nd trimester to 3rd trimester, it further decreased to  $31.8 \pm 1.94$  at labour. This fall was statistically significant then it raised to  $32.83 \pm 3.36$  on the 30th day

II Vs III  $p < .05$   
 II Vs IP  $p < .001$

Similarly STG and VLDL raised from 2nd trimester to labour and declined thereafter this rise was statistically not significant.



## IUGR GROUP

Case no 1

Patient - Sunita  
26yrs

- \* G5P4L3
- \* Middle Socioeconomic Status
- \* Vegetarian
- \* C/o Failure to gain weight
- \* Fundal height does not corresponding to period of Amenorrhoea
- \* USG - Showing mod. to severe IUGR with Oligohydramnios
- \* Outcome  $\Rightarrow$  LSCS done due to foetal distress male baby wt 1.9 kg

	Values mg%					
	II	III	IP	24hrs	7th	30th
			period	PP	dPP	dPP
STC	167	168.4	174	172	170	173
STG	85	92	98	95	93	96
HDL	36	32	30	31	30	33
LDL	114	118	124.4	122	121.4	120.8
VLDL	17	18.4	19.6	19	18.6	19.2

STC  $\text{mmol/L} = 38.76 \text{mg\%}$

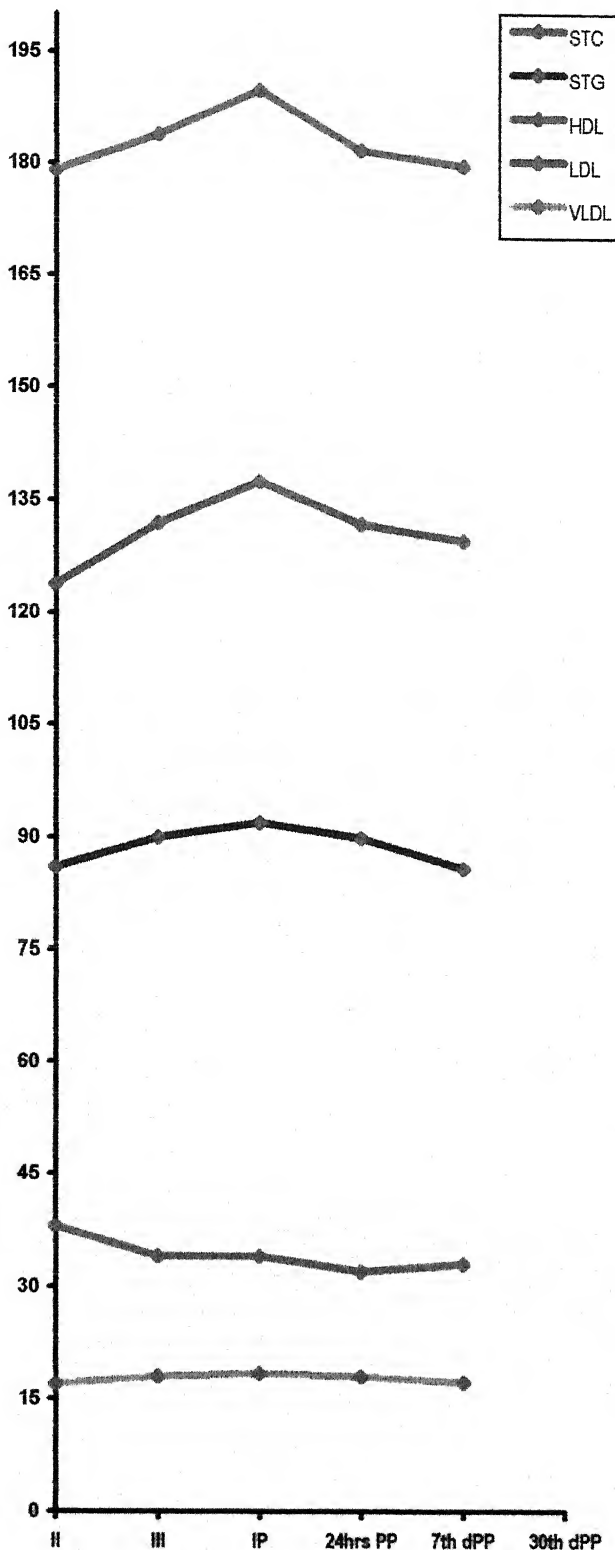
STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$

HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

- \* 16%  $\downarrow$  in HDL , up to labour
- \* slight  $\uparrow$  in STC, maximum value during labour
- \* 8%  $\uparrow$  in LDL , maximum value during labour

mg%



## IUGR GROUP

Case no 2

Patient - Sunita  
24yrs

- \* Primi Gravida
- \* Lower Socioeconomic Status
- \* Vegetarian
- \* C/o Swelling over body, weakness
- \* Fundal height does not corresponding to period of Amenorrhoea
- \* Hb. 4 gm% ,S.Proteins 3gm%
- \* USG - Showing mild IUGR
- \* Out come  $\Rightarrow$  Premature Vaginal delivery female baby, wt 2.1 kg

	Values mg%					
	II	III	IP	24hrs	7th	30th
			period	PP	dPP	dPP
STC	179	184	190	182	180	-
STG	86	90	92	90	86	-
HDL	38	34	34	32	33	-
LDL	124	132	137.6	132	129.8	-
VLDL	17	18	18.4	18	17.2	-

STC  $1\text{mmol/L} = 38.76\text{mg\%}$

STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$

HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

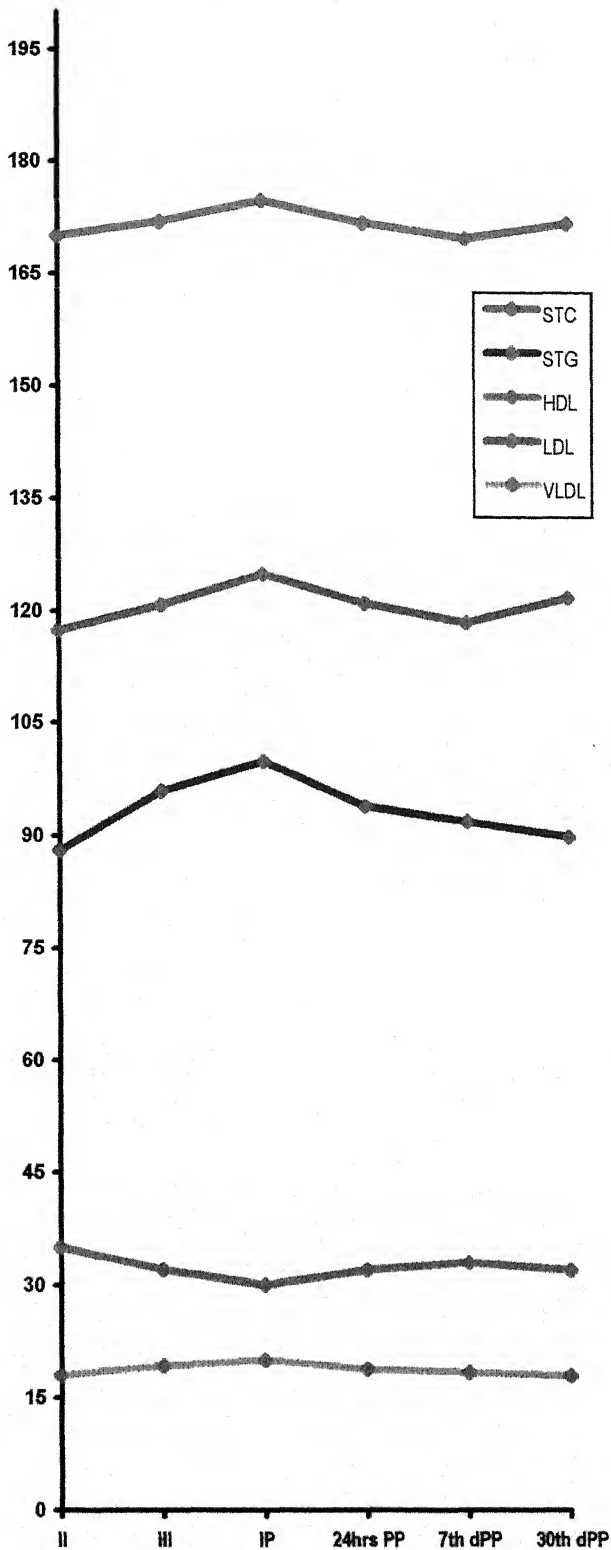
- \* 11%  $\downarrow$  in HDL , up to labour
- \* 5%  $\uparrow$  in STC, maximum value during labour
- \* 11%  $\uparrow$  in LDL , maximum value during labour

## IUGR GROUP

Case no 3

Patient - Uma Verma  
22yrs

- \* Primi Gravida
- \* Middle Socioeconomic Status
- \* Non Vegetarian
- \* Pt. Known case of systemic H.T without features of toxemia
- \* Fundal height does not corresponding to period of Amenorrhoea
- \* USG - Showing mod. to severe IUGR
- \* Out come  $\Rightarrow$  LSCS done male baby wt 1.8 kg



	Values mg%					
	II	III	IP period	24hrs PP	7th dPP	30th dPP
STC	170	172	175	172	170	172
STG	88	96	100	94	92	90
HDL	35	32	30	32	33	32
LDL	117.4	120.8	125	121.2	118.6	122
VLDL	17.6	19.2	20	18.8	18.4	18

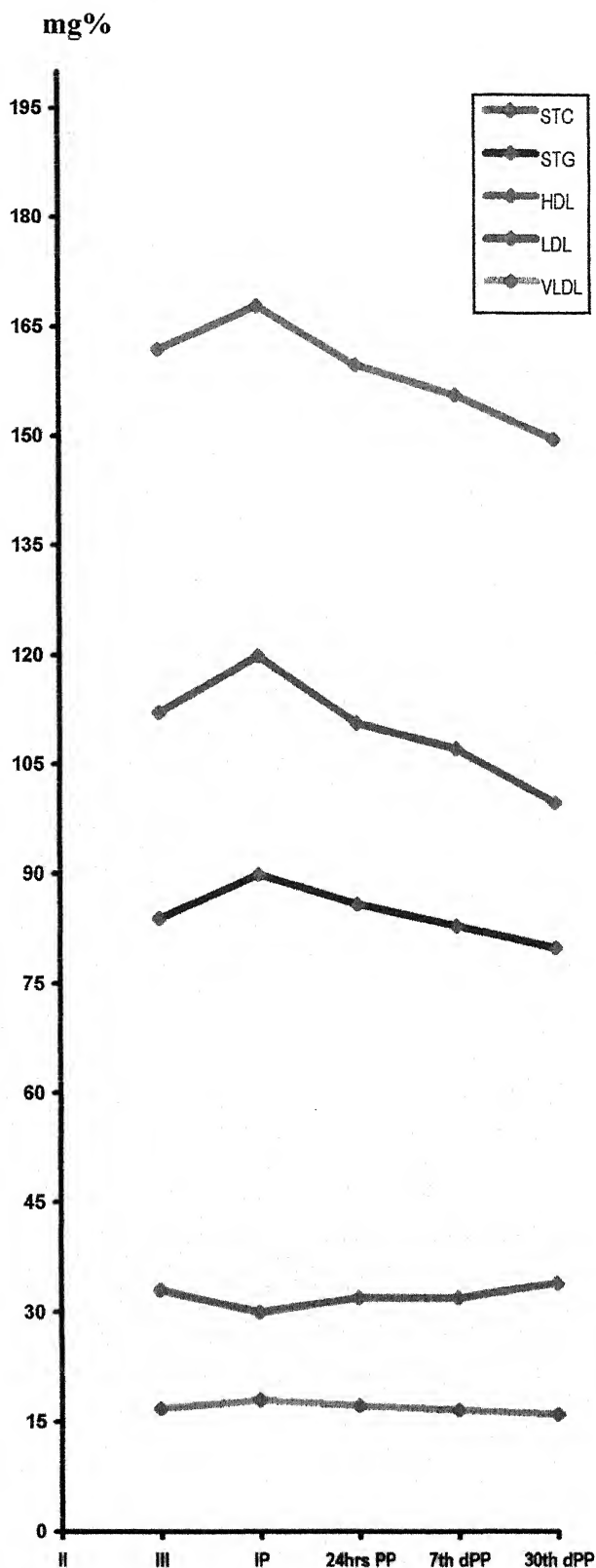
STC  $1\text{mmol/L} = 38.76\text{mg\%}$

STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$

HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

- \*  $14\% \downarrow$  in HDL , up to labour
- \* slight  $\uparrow$  in STC, maximum value during labour
- \*  $6\% \uparrow$  in LDL , maximum value during labour



## IUGR GROUP

Case no 4

Patient - Geeta Tewari

26yrs

- \* G4P3L3
- \* Middle Socioeconomic Status
- \* Vegetarian
- \* C/o Painless, recurrent vaginal bleeding
- \* Fundal height does not corresponding to period of Amenorrhoea
- \* USG - Showing major degree of placenta praevia with mild IUGR
- \* Out come  $\Rightarrow$  LSCS done male baby wt 2.3 kg

	II	III	IP	24hrs PP	7th dPP	30th dPP
STC	-	162	168	160	156	150
STG	-	84	90	86	83	80
HDL	-	33	30	32	32	34
LDL	-	112.2	120	110.8	107.4	100
VLDL	-	16.8	18	17.2	16.6	16

STC  $1\text{mmol/L} = 38.76\text{mg\%}$

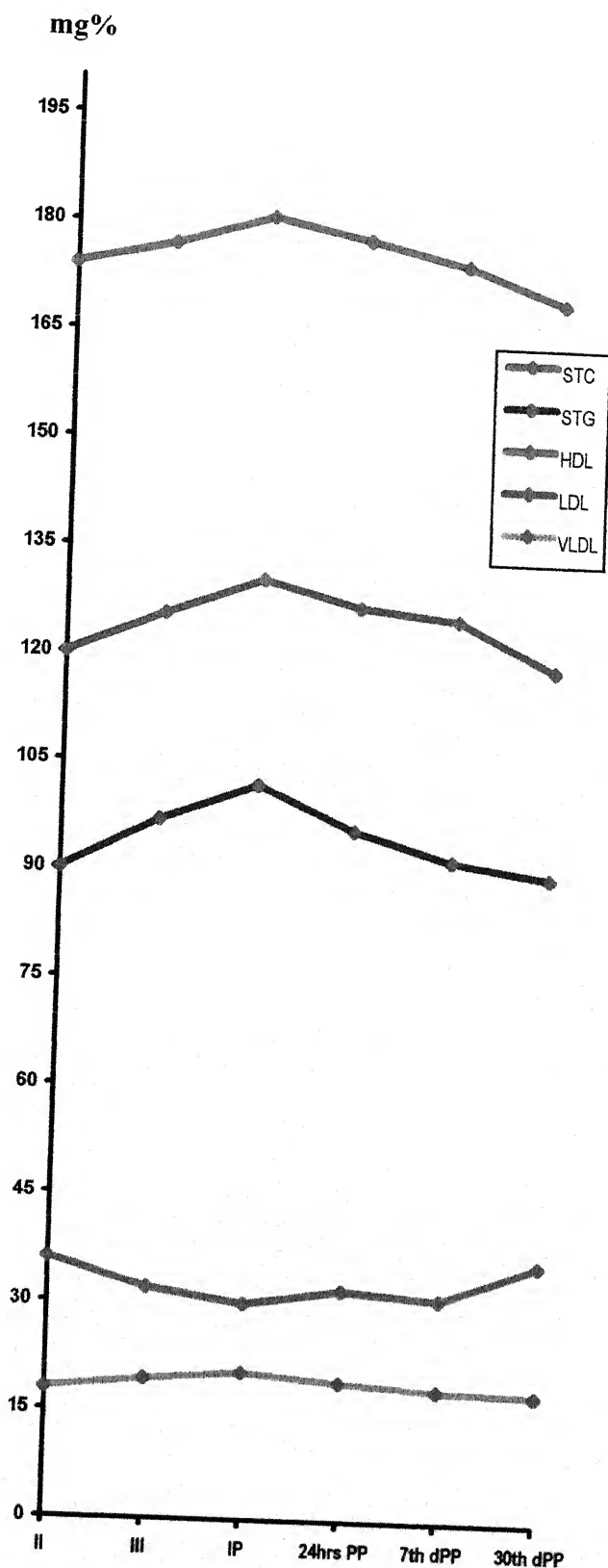
STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$

HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

- \* 9%  $\downarrow$  in HDL , up to labour
- \* slight  $\uparrow$  in STC, maximum value during labour
- \* 7%  $\uparrow$  in LDL , maximum value during labour





## IUGR GROUP

Case no 5

Patient - Rekha  
20yrs

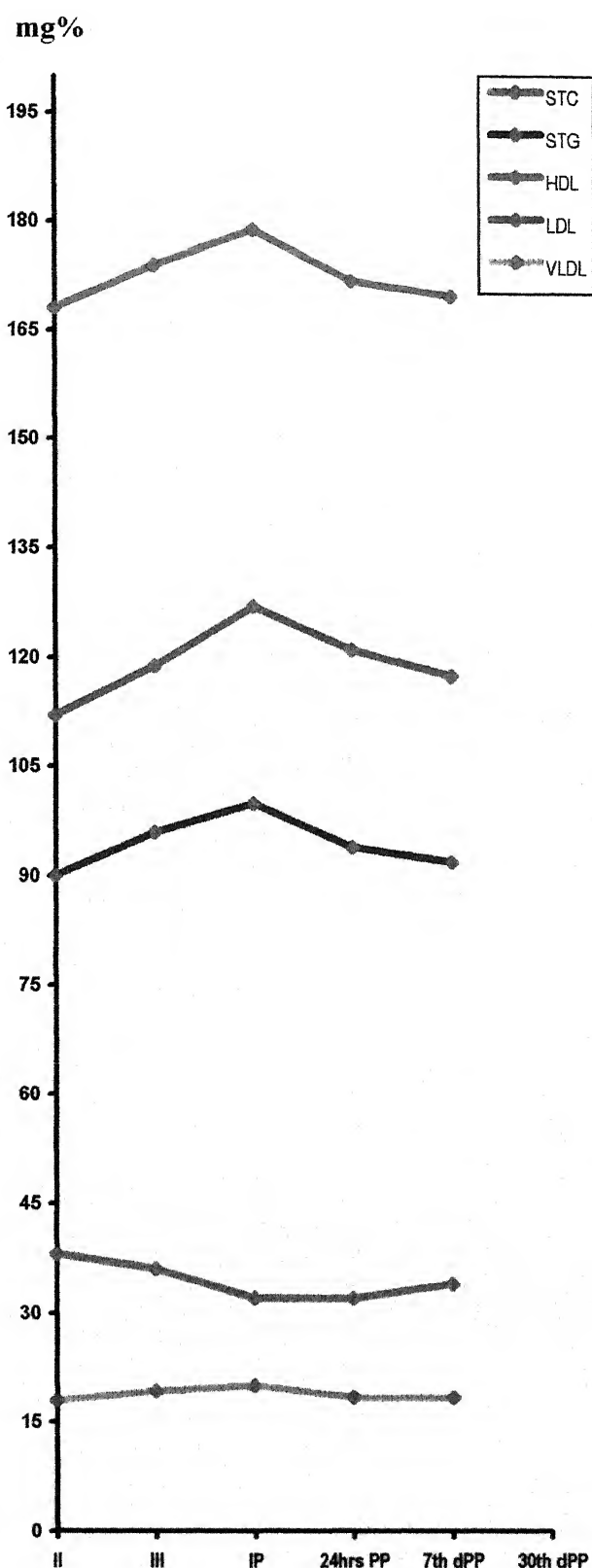
- \* Primi Gravida
- \* Lower Socioeconomic Status
- \* Vegetarian
- \* Detected on routine Antenatal checkup
- \* Fundal height does not corresponding to period of Amenorrhoea
- \* USG - Showing severe degree of IUGR
- \* Complication aspiration pneumonitis
- \* Out come  $\Rightarrow$  LSCS done after 38 weeks due to severity of IUGR female baby, wt 1.8 kg

	Values mg%					
	II	III	IP	24hrs PP	7th dPP	30th dPP
STC	174	177	181	178.2	175	170
STG	90	97	102	96	92	90
HDL	36	32	30	32	31	33
LDL	120	125.6	130.6	127	125.6	119
VLDL	18	19.4	20.4	19.2	18.4	18

STC  $1\text{mmol/L} = 38.76\text{mg\%}$   
 STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$   
 HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

- \* 16.6%  $\downarrow$  in HDL , up to labour
- \* slight  $\uparrow$  in STC, maximum value during labour
- \* 8%  $\uparrow$  in LDL , maximum value during labour



## IUGR GROUP

Case no 6

Patient - Kusum  
25yrs

- \* G2 P2 L2
- \* Lower Socioeconomic Status
- \* Vegetarian
- \* Detected on routine Antenatal checkup
- \* Fundal height does not corresponding to period of Amenorrhoea
- \* USG - Showing evidence of mild IUGR with Small placenta
- \* Out come  $\Rightarrow$  Premature vaginal delivery, female baby, wt 2.2 kg

Values mg%

	II	III	IP	24hrs PP	7th dPP	30th dPP
STC	168	174	179	172	170	-
STG	90	96	100	94	92	-
HDL	38	36	32	32	34	-
LDL	112	118.8	127	121.2	117.6	-
VLDL	18	19.2	20	18.8	18.4	-

STC  $1\text{mmol/L} = 38.76\text{mg\%}$

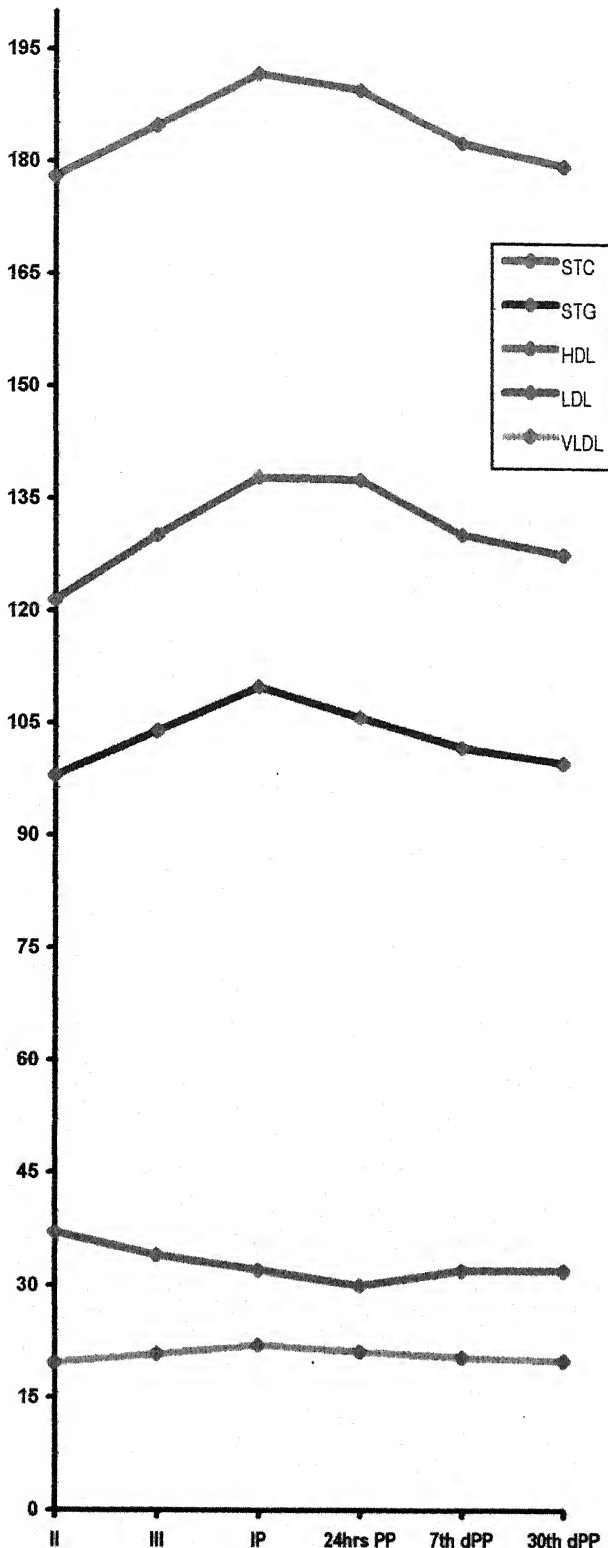
STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$

HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

- \* 16%  $\downarrow$  in HDL , up to labour
- \* 6%  $\uparrow$  in STC, maximum value during labour
- \* 10%  $\uparrow$  in LDL , maximum value during labour

mg%



## IUGR GROUP

Case no 7

Patient - Kaushailya  
26yrs

- \* G4 P3 L3
- \* Middle Socioeconomic Status
- \* Vegetarian
- \* C/o Failure to gain weight
- \* Fundal height does not corresponding to period of Amenorrhoea
- \* USG - Showing evidence of mild IUGR with Oligohydramnios
- \* Out come  $\Rightarrow$  F.T.N.D, male baby  
wt 2.2 kg

Values mg%

	II	III	IP	24hrs PP	7th dPP	30th dPP
STC	178	185	192	190	183	180
STG	98	104	110	106	102	100
HDL	37	34	32	30	32	32
LDL	121.4	130.2	138	137.8	130.6	128
VLDL	19.6	20.8	22	21.2	20.4	20

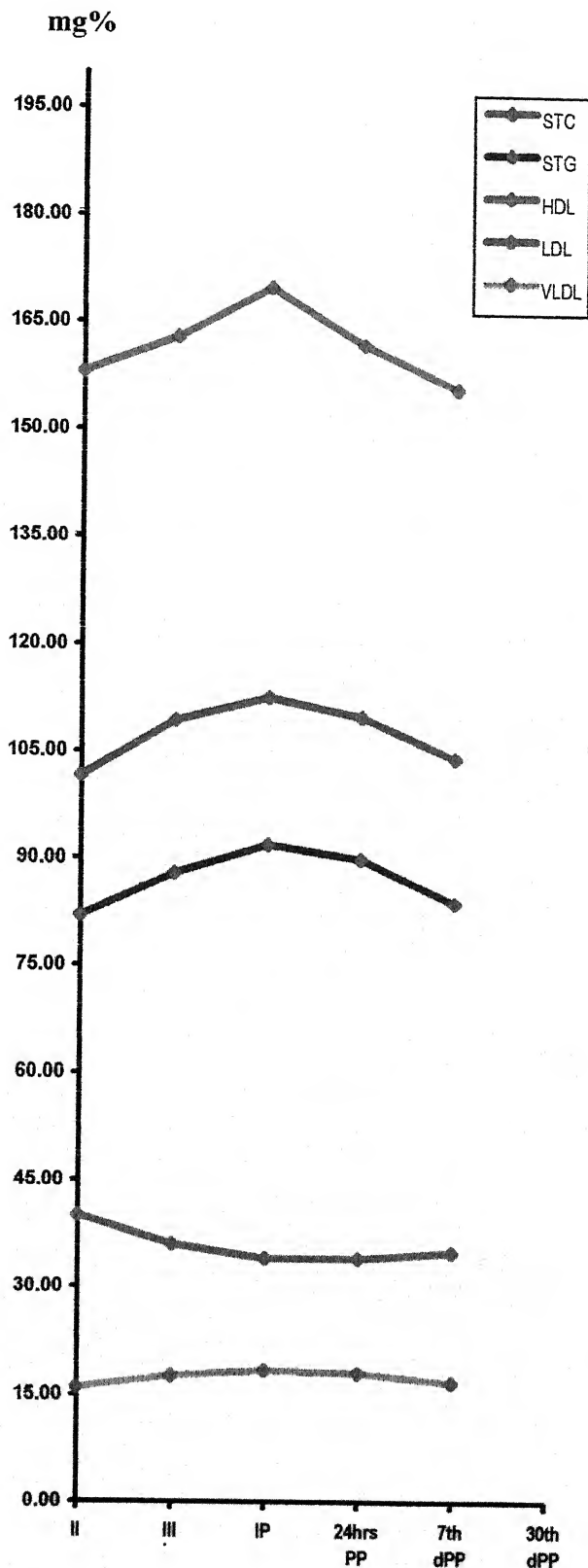
STC  $1\text{mmol/L} = 38.76\text{mg\%}$

STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$

HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

- \* 13%  $\downarrow$  in HDL , up to labour
- \* 7%  $\uparrow$  in STC, maximum value during labour
- \* 12%  $\uparrow$  in LDL , maximum value during labour



## IUGR GROUP

Case no 8

Patient - Nafisa  
26yrs

- \* G3P2L2
- \* Lower Socioeconomic Status
- \* Non Vegetarian
- \* Patient known case of Rheu.H.D
- \* Fundal height does not corresponding to period of Amenorrhoea
- \* USG - Showing evidence of mild IUGR
- \* Out come  $\Rightarrow$  F.T.N.D, female baby wt 2.35 kg

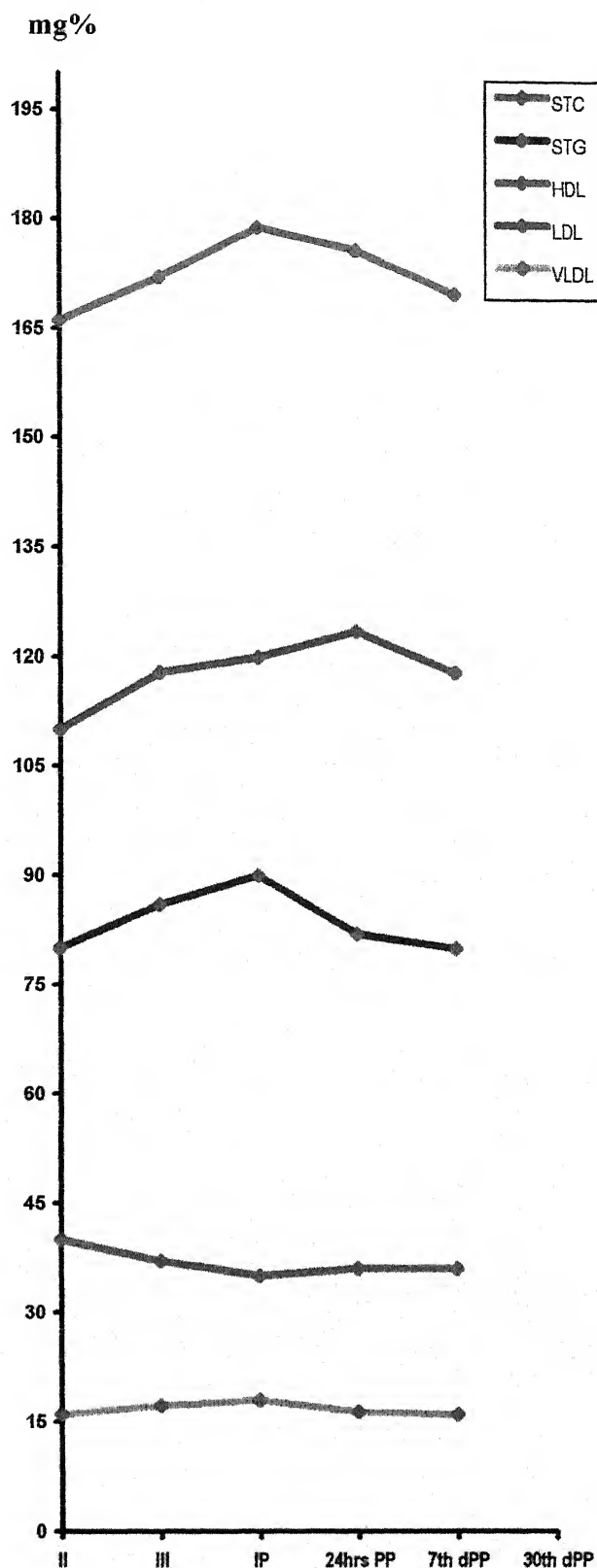
	Values mg%					
	II	III	IP	24hrs PP	7th dPP	30th dPP
STC	158	163	170	162	156	-
STG	82	88	92	90	84	-
HDL	40	36	34	34	35	-
LDL	101.6	109.4	112.6	110	104.2	-
VLDL	16.4	17.6	18.4	18	16.8	-

STC  $1\text{mmol/L} = 38.76\text{mg\%}$   
 STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$   
 HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend:

- \* 15%  $\downarrow$  in HDL, up to labour
- \* 7%  $\uparrow$  in STC, maximum value during labour
- \* 12%  $\uparrow$  in LDL, maximum value during labour

mg%



## IUGR GROUP

Case no 9

Patient - Sushma  
25yrs

- \* G1P1L0
- \* Middle Socioeconomic Status
- \* Vegetarian
- \* C/o Failure to gain weight
- \* Fundal height does not corresponding to period of Amenorrhoea
- \* USG - Showing mild IUGR
- \* Out come  $\Rightarrow$  Premature vaginal delivery, male baby wt 2.0 kg

	Values mg%					
	II	III	IP	24hrs PP	7th dPP	30th dPP
STC	166	172	179	176	170	-
STG	80	86	90	82	80	-
HDL	40	37	35	36	36	-
LDL	110	117.8	120	123.6	118	-
VLDL	16	17.2	18	16.4	16	-

STC  $1\text{mmol/L} = 38.76\text{mg\%}$

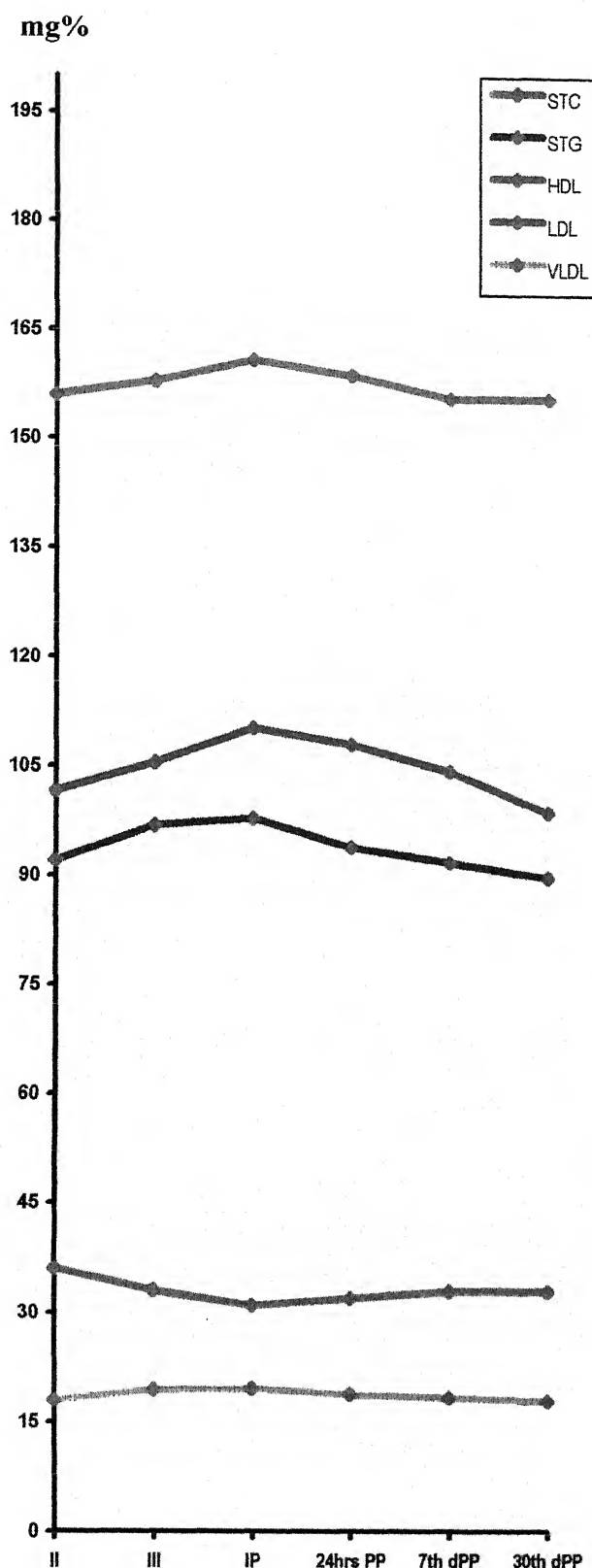
STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$

HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

- \* 12%  $\downarrow$  in HDL , up to labour
- \* 8%  $\uparrow$  in STC, maximum value during labour
- \* 9%  $\uparrow$  in LDL , maximum value during labour

mg%



## IUGR GROUP

Case no 10

Patient - Pista  
26yrs

- \* G3 P2 L2
- \* Lower Socioeconomic Status
- \* Vegetarian
- \* Detected on routine checkup
- \* Fundal height does not corresponding to period of Amenorrhoea
- \* USG - Showing evidence of severe IUGR with Small placenta with Oligohydramnios
- \* Out come  $\Rightarrow$  LSCS done due to failed surgical induction delivery of dead female baby

	Values mg%					
	II	III	IP period	24hrs PP	7th dPP	30th dPP
STC	156	158	161	159	156	156
STG	92	97	98	94	92	90
HDL	36	33	31	32	33	33
LDL	101.6	105.6	110.4	108.2	104.6	99
VLDL	18.4	19.4	19.6	18.8	18.4	18

STC  $1\text{mmol/L} = 38.76\text{mg\%}$   
 STG  $\text{mmol/L} = \text{mg\%} \times 0.0114$   
 HDL  $\text{mmol/L} = \text{mg\%} / 38.76$

### Legend :

- \* 14%  $\downarrow$  in HDL , up to labour
- \* slight  $\uparrow$  in STC, maximum value during labour
- \* 10%  $\uparrow$  in LDL , maximum value during labour



TABLE XII

**Serum Lipoprotein Profile in cases of IUGR in relation to severity of IUGR**

	severity	II trimester	III trimester	IP period	24 hrs PP	7th day PP	30th day PP
STC mg % mean±SD	Severe	166.75± 7.5	168.75± 8	173.75± 8.49	170.25± 7	167.75± 7.4	166.25± 8.2
	Mild	170.13± 8.79	174.25± 9.89	180± 9.8	174.4± 10.4	169.45± 9.2	165.41± 8.7
LDL mg % mean±SD	Severe	112.75± 8.17	117± 5.51	122.5± 8.6	119.5± 7.4	117± 6.2	115± 5.6
	Mild	114.31± 8.99	121± 9.4	128.83± 8.59	122.9± 7.4	118.6± 6.8	111± 5.4
HDL mg % mean±SD	Severe	35.75± .5	32.25± .5	30.25± .57	31.75± .5	31.75± .42	32.75± .38
	Mild	38.91± 1.38	35.55± 1.64	33.35± 1.9	33.05± 1.55	34.05± 2.0	32.91± 1.8

Table XII shows that there was rise in both subgroups of IUGR in STC and LDL from II<sup>nd</sup> trimester to III<sup>rd</sup> trimester and from III<sup>rd</sup> to labour & it was statistically not significant. But fall in HDL from 2<sup>nd</sup> trimester to labour was statistically significant.

Values of STC, LDL were higher in subjects with mild IUGR while these were lower in subjects with severe IUGR. But these changes were statistically not significant. Values of HDL were lower in severe IUGR group in comparison to mild IUGR in the corresponding period of pregnancy, during labour and there after.

II <sup>nd</sup> trimester	mild vs severe	p < .05
III <sup>rd</sup> trimester	mild vs severe	p < .001
during labour	mild vs severe	p < .001
1st PP day	mild vs severe	p < .05

**TABLE XIII COMPARING LIPOPROTEIN PROFILE IN CASES OF PREECLAMPSIA, ECLAMPSIA AND IUGR DURING III<sup>rd</sup> TRIMESTER OF PREGNANCY.**

GROUP	No. of cases	STC mg% mean±S.D	LDL mg% mean±S.D	HDL mg% mean±S.D
Preeclampsia Gp "A"	9	196.77± 30	140.56± 22.48	33.52± 5.52
Eclampsia Gp "B"	17	219.37± 36.3	156.88± 29.96	32.41± 3.96
IUGR Gp "C"	10	171.5±	119.0± 8.67	33.9± 1.76



Table XIII shows that during IIIrd trimester mean STC values was highest in subjects with eclampsia , then in subjects with pre- eclampsia and lowest in subjects with IUGR . This was statistically significant.

A Vs C	$p < .001$
B Vs C	$p < .001$
A Vs B	$p < .05$

Similarly mean LDL value was highest among eclampsia Gp , then in subjects with pre-eclampsia and lowest in IUGR group.

A Vs C	$p < .05$
B Vs C	$p < .001$
A Vs B	$p > .05$

mean HDL value was nearly equal in subjects with pre-eclampsia and IUGR

A Vs C	$p > .05$
B Vs C	$p > .05$
A Vs B	$p > .05$

**TABLE XIV COMPARING SERUM LIPOPROTEIN PROFILE IN CASES OF PREECLAMPSIA,ECLAMPSIA & IUGR DURING LABOUR**

GROUP	No.of cases	STCmg% mean+S.D	LDLmg% mean+S.D	HDL mg% mean+S.D
Preeclampsia	10	207.8± 28.86	152.98± 22.50	32.0± 4.12
Eclampsia	17	234.41± 40.17	178.82± 32.03	29.0± 4.47
IUGR	10	176.9± 11.20	125.4± 10.83	31.8± 3.34

Table XIV shows that during labour mean STC and mean LDL values were highest in subjects with eclampsia , then in subjects with pre-eclampsia and lowest in subjects with IUGR.

For STC & LDL	A Vs C	$p < .001$
	B Vs C	$p < .001$
	A Vs B	$p < .001$

Mean HDL value was maximum in pre-eclampsia and minimum in eclampsia

A Vs C	$p > .05$
B Vs C	$p > .05$
A Vs B	$p > .05$

**TABLE XV SHOWING LIPOPROTEIN PROFILE IN CASES OF  
PREECLAMPSIA, ECLAMPSIA AND IUGR ON 30th POST PARTUM  
DAY.**

GROUP	No.of cases	STCmg% mean+S.D	LDLmg% mean+S.D	HDL mg% mean+S.D
Preeclampsia	4	172.5± 32.24	116.1± 24.49	35.0± 3.36
Eclampsia	6	160.83± 24.5	131.0± 16.27	29.6± 3.88
IUGR	6	165.83±	113.00± 9.83	32.83± 3.36

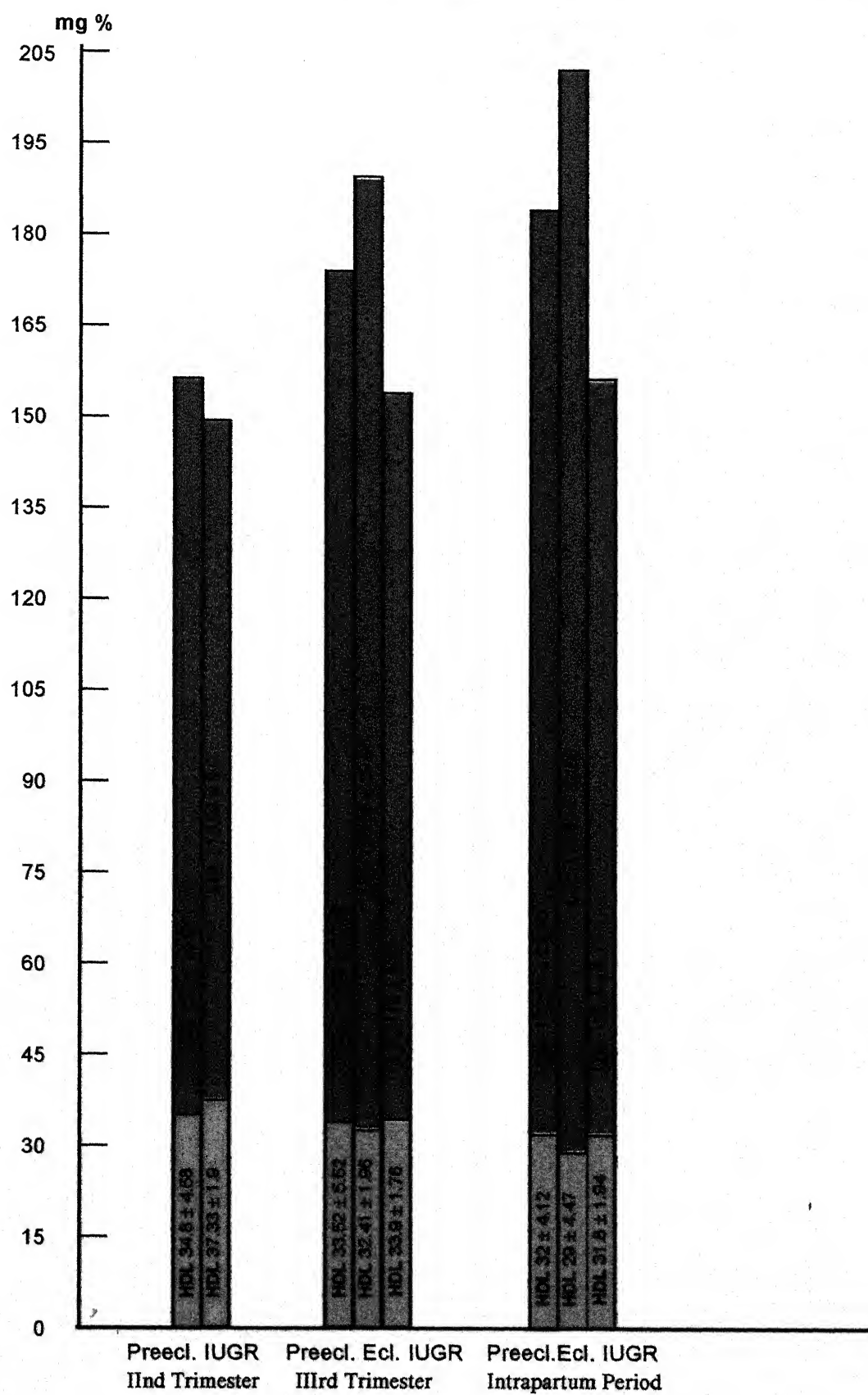
Table XV shows that STC and LDL values were highest in eclampsia , then in pre-eclampsia and lowest in subjects with IUGR

For STC and LDL	A Vs B	p > .05
	A Vs C	p > .05
	B Vs C	p < .05

HDL value was highest in subjects with pre-eclampsia

A Vs C	> .05
B Vs C	> .05
A Vs B	< .05

**Component BAR Diagram Showing changes in HDL and LDL during Pregnancy and labour in patients with preeclampsia, Eclampsia and IUGR**



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# *DISCUSSION*

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## *DISCUSSION*

Hyperlipidaemia of pregnancy is now an established fact. Levels of hormones like oestrogen and progesterone significantly increase during pregnancy and falls with the expulsion of placenta so these hormone are indirectly responsible for altered lipid profile of pregnancy. So in cases of complicated pregnancy (Preeclampsia, Eclampsia & IUGR) there may be alteration in hormone levels which in turn will lead to alteration in lipid profile. So this study include changes in serum lipoproteins in cases of pre eclampsia, eclampsia and IUGR and comparison of these changes with each other.

The Basal level of plasma lipids in normal subjects are as follows:-

STC	=	< 200 mg%
STG	=	< 160 mg %
HDL	=	30 - 90 mg %
LDL	=	50 - 130 mg %
VLDL	=	< 32 mg %

(Annal. int medicine. 1993, 119 (7) part 1.)

### 1. PRE ECLAMPTIC AND ECLAMPTIC Pts ( GROUP A ,GROUP B) :

The observed mean STC during 2<sup>nd</sup> trimester was  $178.33 \pm 21.0$ , which increased to  $196.77 \pm 30$  mg % at 3<sup>rd</sup> trimester, and reaching to  $207.8 \pm 28.86$  mg% during labour. This rise in STC during pregnancy in cases of preeclampsia was statistically significant.

This level abruptly declined to  $183.2 \pm 25.36$  on 24 hours P.P. and slowly reached to  $172.5 \pm 33.24$  on 30<sup>th</sup> P.P. day. This fall on 1<sup>st</sup> P.P. day was also statistically significant.

Similarly in eclampsia mean STC level during 3<sup>rd</sup> trimester was  $219.37 \pm 36.3$  mg % which touched to a peak of  $234.41 \pm 40.17$  mg % during labour and declined to  $209.45 \pm 31.2$  mg % on 24hrs P.P. These change were statistically significant. STC decreased to  $180.83 \pm 24.5$  mg % on 30<sup>th</sup> P.P. day which was much less than the value at 3<sup>rd</sup> trimester. This rise in STC upto labour was in accordance with Nelson, 1966, Pontis and Purandare, 1972, Hyten and Lind, 1973, Chaturvedi, Tandon and Singh, 1978.

The rise in STC level from 3<sup>rd</sup> trimester to I.P. was much less than fall with in 24 hrs. P.P. pt's. with eclampsia, this may be due to the



fact that the values of third trimester were unusually at the end of third trimester and pt's usually delivered within 2-5 days after admission

Values of STC in pt's with eclampsia were much higher in comparison to patients with pre eclampsia in the corresponding period of gestation and these changes were statistically significant.

Rise in STC from 3<sup>rd</sup> trimester to labour was slightly more 6.8% in eclamptic pt's in comparison to pre eclampsia 5.5%. Fall in STC level within 24 hrs P.P. was 10.6% in eclamptic pt's, while in pt's with pre eclampsia it was 11%, it was nearly equal.

#### SERUM LOW DENSITY LIPOPROTEIN - LDL-C :

The observed mean LDL value during 2<sup>nd</sup> trimester in cases of pre eclampsia was  $123.9 \pm 14.94$  mg %, it increased to  $140.56 \pm 22.48$  at 3<sup>rd</sup> trimester and touched to a peak of  $152.98 \pm 22.50$  during labour. Rise from 2<sup>nd</sup> trimester to 3<sup>rd</sup> trimester and from 2<sup>nd</sup> trimester to labour was statistically significant.

However rise from 2<sup>nd</sup> to 3<sup>rd</sup> trimester was not significant statistically. These values declined to  $127.90 \pm 20.07$  on 24 hrs P.P.,  $119.80 \pm 21.01$  on 7<sup>th</sup> day P.P.,  $116.1 \pm 24.49$  on 30<sup>th</sup> day P.P. which was little less than the value at 2<sup>nd</sup> trimester.

Observed mean LDL-c value in pt's with eclampsia was  $156.88 \pm 29.96$  at 3<sup>rd</sup> trimester, during labour it was  $178.82 \pm 32.03$  this rise in LDL was statistically significant these values declined to  $157.37 \pm 20.87$  on 1st P.P. day, it decreased to  $131 \pm 16.27$  on 30<sup>th</sup> P.P. day. It was much less than the value at 3<sup>rd</sup> trimester. The fall after labour was also statistically significant.

Values of LDL -C in pt's with Eclampsia were much higher in comparison to pre eclampsia during Pregnancy, labour and post partum period. Percentage rise of LDL -C was higher in pt's with eclampsia (14%) from 3<sup>rd</sup> trimester to labour, in comparison to 8% in pt's with pre eclampsia, the difference in LDL -C value at 3<sup>rd</sup> trimester between pt's with pre eclampsia and eclampsia was statistically not significant but it became statistically significant during labour due to more rise of LDL -C in eclamptic patients.

Fall in LDL value was 11.8% in pt's with eclampsia, while it was 16% in pt's with pre eclampsia. Similar findings were reported by Kontinen et al, 1964 Mullick and Bagga 1964, Barclay et al, Worth et al 1975, Pontis et al and Knopp et al 1981.

Similar findings were reported by Konttinen et al, 1964, Mullick and Bagga, 1964, Barclay et al, Worth et al, 1975, Pontis et al and Knopp et al, 1981.

#### HDL -C :

The observed mean HDL level during 2<sup>nd</sup> trimester was  $34.8 \pm 4.58$  in pre-eclamptic pts, it declined to  $32 \pm 4.12$  during labour. This fall was statistically just significant. The level of HDL started rising again soon after labour and it reached to  $35.0 \pm 3.36$  at 30<sup>th</sup> P.P. day. In pts with eclampsia the mean level of HDL during 3<sup>rd</sup> trimester was  $32.4 \pm 3.96$  mg % which decreased to  $29 \pm 4.47$  during labour and gradually raised to  $30.1 \pm 5.40$  on 24 hrs P.P. and further decreased to 29.6 on 30<sup>th</sup> P.P. day. The fall in HDL from 3<sup>rd</sup> trimester to labour was statistically highly significant.

When we compared HDL level in both groups we found that mean value of HDL was much lower in pts with eclampsia than in pre-eclampsia in the corresponding period of gestation, labour and after delivery. The difference in the values during labour and in the post partum period was statistically significant. The HDL level started rising early in pts with pre-eclampsia while in pts. with eclampsia value remained on lower side even upto 30<sup>th</sup> P.P. day. Total decrease of HDL-C from 3<sup>rd</sup> trimester to labour was only 8.04 % in pts. with pre-eclampsia while it was 11.7 % in pts with eclampsia.

As level of HDL-C is influenced by the level of Oestrogen and Oestrogen during pregnancy are mainly synthesized by placenta. HDL-C reflects placental function. Toxaemia of pregnancy is associated with chronic placental insufficiency leading to decreased production of Oestrogen. In our study we also found the same type of change that is fall of HDL level in Pts of eclampsia and pre-eclampsia during pregnancy. HDL - C in pre-eclampsia has also been reported previously (Scandrett, 1959).

#### Serum Triglycerids (STG)

In patients with pre-eclampsia the observed mean STG value was  $97.2 \pm 16$  during 2<sup>nd</sup> trimester, it raised to  $110 \pm 20.33$  during labour after labour it declined to  $99.9 \pm 19.2$  on 1<sup>st</sup> P.P. day and further decreased to  $89.5 \pm 22.52$  on 30<sup>th</sup> P.P. day. The rise in STG in pts with pre-eclampsia from 2<sup>nd</sup> trimester to labour was 13.4 % and it was statistically significant. STG in pre-eclamptic pts showed a decreasing trend during post partum period.



In pts with eclampsia mean STG values were  $111.75 \pm 24.79$  during 3<sup>rd</sup> trimester,  $114.82 \pm 26.42$  during labour and it decreased thereafter to  $85.5 \pm 18.02$  on 30<sup>th</sup> P.P. day. Rise from 3<sup>rd</sup> trimester to labour was only 2.6% and it was statistically not significant. These findings are in accordance with previous observations (Konttinen et al 1979, Kalkhott et al 1978, Knopp et al, 1981, Dermandy et al, 1989). While comparing the values. In the same period in both group of patients values were higher among patients with eclampsia except on 30<sup>th</sup> P.P. day. Slow rise in STG during pregnancy in both group of patients may be due to the fact that toxemia of pregnancy is associated with chronic placental insufficiency leading to decreased production of Oestrogens.

#### Very Low Density lipoproteins - VLDL

In pt's with pre-eclampsia, VLDL values were  $19.28 \pm 3.3$  during 2<sup>nd</sup> trimester,  $22.1 \pm 3.81$  during labour and thereafter it gradually decreased to  $18.5 \pm 4.11$  on 7<sup>th</sup> P.P. day and  $17.9 \pm 4.5$  on 30<sup>th</sup> P.P. day. Rise in VLDL was 14.5% upto labour and it was statistically significant.

In pts with eclampsia VLDL values were  $22.35 \pm 5.12$  during 3<sup>rd</sup> trimester;  $23 \pm 5.38$  during labour and  $17 \pm 3.94$  on 30<sup>th</sup> P.P. day. There was very slight rise (3%) from 3<sup>rd</sup> trimester to labour in pts with eclampsia.

We divided the pts of pre-eclampsia broadly into two groups depending on its severity.

- patients with mild pre-eclampsia
  - \* BP < 160 / 110 mm Hg
  - \* Proteinuria absent
- patients with severe pre-eclampsia
  - \* BP > 160 / 110 mm Hg
  - \* Protein uria present

Though values of STC, LDL during 2<sup>nd</sup> trimester were less in patients with severe pre-eclampsia but rise was more in comparison to patients with mild IUGR. Percentage rise in STC and LDL was 13.8% and 20% respectively in pts with mild pre-eclampsia while it was 21% and 26% in pts with severe pre-eclampsia. Values of HDL were lower in patients with severe pre-eclampsia and this difference was statistically significant.

We also studied the serum lipoprotein profile in cases of pre-eclampsia who delivered low birth weight babies (weight < 2.5 kg). There

was not much difference in levels of STC and LDL in pts who delivered LBW babies from the mean value for the whole group as such. However decrease in HDL level from 2<sup>nd</sup> trimester to labour was more (13%) in this group in comparison to whole group where it was 8% .

#### Serum lipoprotein in pt's with unfavourable outcome -

In our study incidence of prematurity was 20% in patients with pre-eclampsia while incidence LBW babies was 30%.

In contrast to pts. with pre-eclampsia , patients of eclampsia who delivered still births ( 5 out of 18) child showed marked deviation of serum lipoproteins from other patients of similar groups . mean value of STC in patients who delivered still birth child during 3<sup>rd</sup> trimester was  $251.3 \pm 42.78$  while the mean value of whole group was  $219.37 \pm 36.3$  , it raised to  $278.0 \pm 39.2$  during labour it decreased to  $236.8 \pm 34.45$  on 24 hrs P.P. and came to  $205 \pm 7$  on 30<sup>th</sup> P.P. day . Similarly LDL value during 3<sup>rd</sup> trimester was  $192.8 \pm 58.72$  , it touched to a peak of  $220 \pm 31.72$  during labour , then it declined to  $183 \pm 29.51$  on 24 hrs . P.P. and decreased to  $150 \pm 10$  on 30<sup>th</sup> P.P. day . Differences in the values of STC & LDL during 3<sup>rd</sup> trimester labour and in the post partum period was statistically significant with the mean values of these parameter for the group as such , however there was not much difference in the level of HDL as such . Rise in STC and LDL in pts. with still birth was 10.7% and 14.5% respectively , while it was 6% and 14.5 for the group as such . Similarly fall in the HDL was 14 % and 10 % respectively.

#### Effect of parity -

We studied the relation of parity with pre-eclampsia and eclampsia . pre-eclampsia was found to be more common ( 6 out of 10) in primiGravida . Similarly eclampsia was also found to be more common (11 out of 17) in PrimiGravida. Similar observation was made by Colvin et al (1939) who noted high percentage of cases of Toxaemia among Young primiGravida . Earlier workers also noted similar observations (Acosta - Sisson and bains , 1930 : Upshaw et al , 1932 ) . Colvin also concluded that Toxaemia is more concerned with age rather than parity . We also studied the differences in serum lipoproteins in relation to parity. In pt's with pre-eclampsia mean value of STC and LDL was little higher in PrimiGravidae in comparison to multi Gravidae but this was statistically not significant . There was no constant difference in the level of HDL in both group of patients.

In patients with eclampsia levels of STC and LDL was higher during third trimester and on 30<sup>th</sup> P.P. day in Primi Gravidae in

comparison to multi Gravidae . Like pt's of pre-eclampsia , there was no constant difference in the level of HDL in both groups.

In the present study most of the Toxaemic mothers belonged to low and middle socio-economic status . Similar observations was made by De alvarez and Bratvold (1961) . Most of the Toxaemic mothers were vegetarian . 70% of the pre-eclamptic and eclamptic patients were vegetarian . The dietary content of protein and fat plays a part in the production of toxaemia of pregnancy. Majority of earlier Hinselmann (1923) Groene (1923) , and Bublitzen Chenko (1925) concluded that lesser intake of protein and fat attributed to the production of Toxaemia.

40% of the pts. presented with unconsciousness in eclampsia group . On observing the lipoprotein profile it was found that mean STC & mean LDL was much higher in these patient in comparison to other patients without unconsciousness and this difference in STC & LDL level was Statistically significant during pregnancy , labour and post partum period . So it can be concluded that severity of eclampsia affects lipoprotein profile directly.

One pt. of pre-eclampsia group developed renal failure but there was no significant changes in the serum lipoproteins from other pts. 4 out of 17 pts. of eclampsia group developed renal failure and two patients showed impaired liver function but there was no significant changes in serum lipoproteins from other pts. though values were little higher specially in patients with renal failure.

## II Patients with Intrauterine growth retardation - ( Group - C)

The observed mean STC value in this group during 2<sup>nd</sup> trimester was  $168.44 \pm 7.95$  , it raised minimally to  $171.5 \pm 9.0$  during 3<sup>rd</sup> trimester and touched to a peak of  $176.9 \pm 9.59$  mg % during labour . This declined to  $172.3 \pm 9.2$  on 24 hrs P.P. and reached to  $165.83 \pm 10.83$  on the 30<sup>th</sup> P.P. day . Rise in STC upto labour and fall on 24 hrs P.P. , 7<sup>th</sup> P.P. day and 30<sup>th</sup> day was statistically not significant . Total rise in STC was only 4.7% while it was 16% in pts. with pre-eclampsia.

When we compared the STC level in the three groups , they were lowest in pts. with IUGR during antepartum period , labour and post partum period and this difference was statistically highly significant.

Mean LDL value was  $113.53 \pm 8.0$  during 2<sup>nd</sup> trimester ,  $119 \pm 8.67$  at 3<sup>rd</sup> trimester and  $125.4 \pm 8.77$  during labour . It raised only 10% from 2<sup>nd</sup> trimester to labour while in pts. with preeclampsia total rise was 24% and 14% from 3<sup>rd</sup> trimester to labour in pts . with preeclampsia.

Rise in LDL value was not statistically significant . LDL value was also lowest in pts. with IUGR and difference in pts. with IUGR with pts. of toxemia was statistically significant.

Observed mean HDL value was though highest in pts. with IUGR during 2<sup>nd</sup> trimester but it's level declined rapidly reaching to  $31.8 \pm 1.94$  during labour . Total decrease in HDL was 14% in pts with IUGR while it was 8% in pts. with preeclampsia and 10.4% in pts . with eclampsia (from 3<sup>rd</sup> trimester only). The fall in HDL level in this group was statistically highly significant, but fall in HDL was highest from 2<sup>nd</sup> trimester to labour among pts. with IUGR in comparison to preeclampsia.

Mean STG and VLDL levels during 2<sup>nd</sup> trimester were  $87.88 \pm 4.13$  and  $17.52 \pm 2.5$  , these values raised to  $97.2 \pm 7.1$  and  $19.44 \pm 2.13$  during labour . These levels gradually declined to  $92.7 \pm 5.62$  and  $18.54 \pm 2.2$  on 1<sup>st</sup> P.P. day and  $91 \pm 4.27$  &  $18.2 \pm 2.6$  on the 30<sup>th</sup> P.P. day . Rise in STG and VLDL was statistically not significant . When we compared these values with values of preeclamptic and eclamptic patients , values were the lowest in pts with IUGR and these differences were statistically significant during pregnancy & labour.

The rapid fall and low levels of HDL during pregnancies complicated by IUGR may be due to the chronic placental insufficiency leading to the decreased production of Oestrogen and ultimately causing marked fall in HDL level.

In normal pregnancy rising maternal plasma titre of Oestrogen appears to be the principle hormonal factor responsible for enhanced endogenous synthesis of triglycerides . It has been studied by Berzin and Vonstudintz (1957) that oestrogen causes rise in circulatory lipid levels . In cases of IUGR lower Oestrial between 32-34 weeks are valuable in predicting IUGR when screening high risk cases (Beischer et al , 1984 ) so lower oestrial may in turn lead to lesser rise in triglyceride levels in IUGR cases.

The serum concentration of VLDL is dependant on it's rate of secretion by liver & degradation by lipoprotein lipase and lipoprotein lipase activity was found to be significantly increased in cases of chronically deprived fetuses like in case of IUGR in order to supply free fatty acids to the fetus (Y. Biale , 1985 ) . In these situations of chronic fetal distress like in IUGR there is decreased supply of glucose to fetus , so complimentary changes take place in the placenta leading to an increased supply of free fatty acids to fetus which are liberated by hydrolysis of circulating maternal triglycerides .



It is known that cholesterol is transported in the form of lipoprotein in the plasma and higher proportion of cholesterol is formed in LDL (beta lipoprotein) . Studies on cultured fibroblast lymphocytes and arterial smooth cells have shown existence of specific binding sites or LDL receptors . After binding LDL is internalized by an adsorptive endocytice process and hydrolysed by lyso somal enzymes giving rise to amino acids cholesterol and free fatty acids . It is postulated that in cases of IUGR there may be defect in receptor level of LDL , but the exact nature is not known . In our study we found slight rise in LDL level during pregnancies of Pts with IUGR , but we could not find out the exact cause for which further study is needed.

We broadly divided IUGR group into two subgroups depending on it's severity decided by USG examination of fetus and monitoring it's growth as pregnancy advanced . We stuied the difference in lipoproteins in both subgroup and found that though STC , LDL values were lower in pt's with severe IUGR in comparison to patients with mild IUGR but it was not significant statistically. HDL values were much lower in pts with severe IUGR and it was statistically significant.

For HDL	mild Vs severe	II <sup>nd</sup> trimester	p < .05
	mild Vs severe	III <sup>rd</sup> trimester	p < .001
	mild Vs severe	during labour	p < .001

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*SUMMARY & CONCLUSION*

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## SUMMARY AND CONCLUSION

The present study was carried out to evaluate the changes in serum lipoproteins in high risk pregnancies (Preeclampsia , eclampsia & IUGR) during their Ante partum , Intra partum and Post partum period (upto 1 month) and also to know the changes in lipoprotein pattern in relation to parity , severity and also to know the incidence of other complications related to disease itself.

Total 37 cases were taken (10 preeclampsia , 17 eclampsia and 10 IUGR) and they were followed up during Ante partum , Intra partum and Post partum period . Lipoprotein levels (STC , STG , HDL , LDL & VLDL) were estimated during 2<sup>nd</sup> and 3<sup>rd</sup> trimester , intra partum 24 hrs. , 7 day and 1 month post partum.

### 1. Serum lipoproteins during Ante partum period

#### (a) Serum Total Cholesterol ( STC)

(i) In Preeclampsia rise from 2<sup>nd</sup> trimester to 3<sup>rd</sup> trimester was statistically significant (  $p < .05$  ) while rise from III<sup>rd</sup> trimester to labour was statistically not significant

(  $p > .05$  ).

(ii) In Eclampsia rise from 3<sup>rd</sup> trimester to labour was statistically highly significant (  $p < .001$  ).

(iii) In cases of IUGR rise in STC from 2<sup>nd</sup> to 3<sup>rd</sup> , 3<sup>rd</sup> to labour and from 2<sup>nd</sup> trimester to labour was statistically not significant (  $p > .05$  )

(iv) Values were highest in cases of eclampsia.

#### (b) Low density Lipoproteins (LDL)

(i) In pts. with preeclampsia rise from 2<sup>nd</sup> trimester to labour was statistically highly significant  $p < .001$  and from 3<sup>rd</sup> trimester to labour it was statistically not significant (  $p > .05$  )

(ii) In pts. with eclampsia rise from 3<sup>rd</sup> trimester to labour was statistically highly significant (  $p < .001$  )

(iii) In pts. with IUGR rise from 2<sup>nd</sup> trimester to 3<sup>rd</sup> trimester & from 3<sup>rd</sup> to intrapartum and from 2<sup>nd</sup> to labour was statistically not significant (  $p > .05$  )

(iv) Values were highest in pts with eclampsia.

#### c. High Density Lipoproteins( HDL) -

(i) In preeclamptic pts HDL values gradually declined from 2<sup>nd</sup> trimester to 3<sup>rd</sup> trimester & from 3<sup>rd</sup> to labour

II<sup>nd</sup> vs III<sup>rd</sup>  $p > .05$

III<sup>rd</sup> vs I.P.  $p > .05$



- II<sup>nd</sup> vs I.P.  $p < .05$
- (ii) In eclamptic pts HDL gradually declined from 3<sup>rd</sup> trimester to labour  
 III<sup>rd</sup> vs I.P.  $p < .001$
- (iii) In pts with IUGR HDL declined from 2<sup>nd</sup> trimester to 3<sup>rd</sup> and from 3<sup>rd</sup> trimester to labour.  
 II<sup>nd</sup> vs III<sup>rd</sup>  $p < .05$   
 II<sup>nd</sup> vs I.P.  $p < .001$
- (iv) values were lowest among pts with eclampsia while fall from 2<sup>nd</sup> trimester to labour was higher in pts with IUGR in comparison to preeclampsia.
- (d) Serum triglycerides (STG) & Very low density lipoprotein (VLDL) -
- (i) In pts. with preeclampsia rise in STG and VLDL from 2<sup>nd</sup> trimester to labour was significant  
 II<sup>nd</sup> vs I.P.  $p < .05$   
 II<sup>nd</sup> vs III<sup>rd</sup>  $p > .05$   
 III<sup>rd</sup> vs I.P.  $p > .05$
- (ii) In eclamptic pts. STG and VLDL raised minimally  $p > .05$
- (iii) In pts with IUGR STG and VLDL raised from II<sup>nd</sup> to III<sup>rd</sup> and from III<sup>rd</sup> to labour but it was statistically not significant  
 $p > .05$
- (iv) Values were highest among pts with eclampsia

## 2. Serum lipoproteins during labour

- (a) STC, LDL, STG and VLDL attained their peak during labour in all the three groups.
- (b) HDL declined from their initial value gradually in all the three group and was lowest during labour.
- (c) STC, LDL, STG and VLDL values were highest in pts with eclampsia while HDL values were lowest in eclampsia.

## 3. Serum Lipoprotein during post partum period

- (a) Serum Total Cholesterol (STC)
- (i) In pre eclamptic pts it declined abruptly within 24 hrs and then gradually upto 1 month  
 IP vs 24 hrs PP  $p < .001$   
 IP vs 7thday PP  $p < .001$   
 It returned to its initial value on 7th PP day
- (ii) In pts with eclampsia it declined abruptly within 24 hrs and then gradually upto 1 month  
 IP vs 24 hrs. PP  $p < .001$   
 IP vs 7 thday PP  $p < .001$   
 Fall was too much on 30<sup>th</sup> d PP in comparison to its initial value on III<sup>rd</sup> trimester.

(iii) In pts. with IUGR it declined gradually and reached to its initial value on 7<sup>th</sup> PP day

IP vs 1<sup>st</sup> PP day                       $p > .05$   
 IP vs 7<sup>th</sup>, 30<sup>th</sup> d PP                 $p > .05$

(b). Low Density Lipoprotein (LDL)

(i) in pts with pre eclampsia it fall abruptly with in 24 hrs P.P. and then gradually upto 30<sup>th</sup> d PP

IP vs 24 hrs PP             $p < .05$   
 IP vs 7md PP               $p < .05$

It returned to it's initial value near about 7<sup>th</sup> day P.P

(ii) In Eclampsia pts. it declined maximum within 24 hrs PP then gradually upto 1 month

IP vs 24 hrs. PP            $p < .001$   
 IP vs 7thd PP               $p < .001$   
 IP vs 30<sup>th</sup> md PP           $p < .001$

It returned to it's initial value on 30<sup>th</sup> PP day

(c) HighDensityLipoprotein(HDL)

(i) In pts with preeclampsia HDL raised within 24 hrs PP then upto 7thd PP but it was constant after that.

IP vs 24 hrs PP             $p > .05$   
 IP vs 7md PP               $p < .05$

(ii) In pts with eclampsia it increased within 24 hrs. P.P. after that it decreased then again increased.

IP vs 24 hrs PP             $p > .05$   
 IP vs 7md PP               $p > .05$   
 IP vs 30md PP              $p > .05$

(iii) In pts. with IUGR , it raised gradually upto 7<sup>th</sup> PP day then declined on 30<sup>th</sup> P.P. day

IP vs 24 hrs. PP             $p > .05$   
 IP vs 7thd PP               $p > .05$   
 IP vs 30thd PP              $p > .05$

(d) Serum Triglyceride & Very Low Density Lipoprotein(STG & VLDL)

(i) In pts with pre eclampsia it fall maximum within 24 hrs then gradually upto 30thd P.P.

IP vs 24 hrs.PP             $p > .05$   
 IP vs 30 thd PP             $p < .05$

(ii) In pts. with eclampsia it decreased maximum within 24 hrs P.P. then gradually upto 30<sup>th</sup> d . P.P'

IP vs 24 hrs PP             $p > .05$   
 IP vs 30<sup>th</sup> d PP             $p < .05$

### Serum Lipoproteins in relation to severity-

- (i) On comparing the serum lipoprotein in mild and severe pre eclampsia . Percentage increase in STC and LDL was more in pts with severe pre eclampsia , values of HDL were lower in severe Pre eclampsia
- (ii) In Eclampsia group, pts delivering still birth child showed much higher STC , LDL values than other pts in the same group and also decrease in HDL was slightly more in those pts.
- (iii) In pts with IUGR , though values of STC and LDL were lower in pts. with severe IUGR but this difference was statistically not significant . However HDL level was much less in pts with severe IUGR and this difference was significant during pregnancy and labour.

One pt. from pre eclampsia group and four pts from Eclampsia group developed renal failure , two eclamptic pts. showed abnormal LFT . But serum lipoproteins were not markedly deviated in these pts, in comparison to other pts. except pts. with renal failure in eclampsia group but changes were not significant

### Serum Lipoprotein In relation to parity -

- (i) In Pre eclamptic pts mean value of STC and LDL were little higher in Primigravida but it was statistically not significant , no constant difference in level of HDL.
- (ii) In Eclamptic pts STC and LDL values were higher in Primigravida in comparison to multigravida but this was statistically not significant there was no constant difference in HDL level .
- (iii) 60% of pts were Primigravida in both groups.

### Socio Economic status

40% of pre eclamptic pts , 55% of Eclamptic and 50% of IUGR pts were belonging to lower socio-economic status.

### Conclusion -

At the end of our study we found that

\*STC , LDL raised significantly in pts with Pre eclampsia , Eclampsia & attained maximum value during labour and decreased thereafter.

\*STC , LDL raised minimally in pts with IUGR and attained their peak at labour and decreased thereafter

\*HDL constantly decreased during pregnancy in all the three groups but this decrease was maximum in pts with IUGR

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*MASTER CHART*

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### PRE ECLAMPSIA GROUP "A"

Serial no	Name	Age	Gravida	S.Econo	Diet	Mode of Delivery	Out come
1	Monorma	23yr	Primi	Middle	Veg .	FTND	M Baby 2.8 Kg
2	Mamta jain	21yr	Primi	Middle	Veg	FTND	F Baby 2.6 kg
3	Parvati	20yr	Primi	Lower	Veg	FTND	F Baby 2.6 kg
4	Rupali Rai	26yr	G2 P2 L2	High	N.Veg	Elective c.s.	M Baby 2.9 kg
5	Sangeeta	22yr	Primi	High	N.Veg	FTND	M Baby 2.8 kg
6	Sangeeta Jain	26yr	G3 P2 L2	High	Veg	FTND	M Baby 2.6 kg
7	Guddi	22yr	G2 P2 L2	Lower	Veg	FTND	F Baby 2.6 kg
8	Sudha	24yr	Primi	Lower	Veg	Veginal delivery (Premative)	F Baby 2 kg
9	Kiran	24yr	G2 P2 L2	Middle	N.veg	FTND	M Baby 2.25 kg
10	Bimla	22yr	Primi	Lower	Veg	Vaginal delivery Primitive	M Baby 2.4 kg

### ECLAMPSIA GROUP "B"

Name	Age	Gravida	S.Econ.	diet	Mode of delivery	Out come
Rajni	23 Yr.	Primi	Middle	N. Veg	Premature delivery	F.baby 2.4 Kg
Guddi	26 Yr.	G3 P2 L2	Lower class	N. Veg	Vaginal delivery	Dead baby
Meena	25 Yr.	Primi	Upper Class	N. Veg	FTND	M.Baby 2.8 Kg
Hemwati	22 Yr.	Primi	Middle	Veg.	Premature delivery	
Kashi bai	25 Yr.	G1 P1 L1	Lower class	Veg.	FTND	F.Baby 2.7 Kg
Gomti	25 Yr.	G3 P3 L3	Lower class	Veg.	Vaginal delivery	F.Baby 2.5 Kg
Mala	23 Yr.	Primi	Middle	Veg.	FTND	F.Baby 2.4 Kg
Geeta	18 Yr.	Primi	Middle	Veg.	Forccep delivery	F.Baby 2.8 Kg
Raj Kumari	25 Yr.	G2 P1 L1	Middle	N. Veg	Vaginal delivery	F.Baby 2.0 Kg
Susheela	26 Yr.	G3 P3 L3	Lower class	Veg.	FTND	F.Baby 2.8 Kg
Madhu	18 Yr.	Primi	Lower class	N. Veg	Full term Veginal delivery	
Pawan Kumari	21 Yr.	Primi	Lower class	Veg.	FTND	F.Baby 2.4 Kg
Raj Kumari	26 Yr.	G2 P2 L2	Lower class	Veg.	FTND	F.Baby 2.7 Kg
Kunwar Baj	20 Yr.	Primi	Lower class	Veg.	Forcep delivery of still born (FT)	
Angoori	24 Yr.	Primi	Lower class	Veg.	Vaginal delivery	
Jareena	21 Yr.	Primi	Middle	N. Veg	FTND	F.Baby 2.6 Kg
Premwati	26 Yr.	Primi	Middle	Veg.	FTND	F.Baby 2.4 Kg

IUGR GROUP "C"

Cases no	Name	Age	Gravida	S.Ecno	Diet	Mode of del.	Out come	Height	Weight
1	Sunita	26 yrs	G5P4L3	middle	veg	CS	M. baby 1.9 kg	5'1"	48 kg
2	Sunita	24 yrs	Primi	lower	veg	premature vaginal del.	F. baby 2.10 kg	5'2"	42 kg
3	Uma Verma	22 yrs	Primi	middle	N.veg	CS	M. baby 1.8 kg	5'0"	48 kg
4	Geeta Tewari	26 yrs	G4P3L3	lower	veg	CS	M. baby 2.3 kg	5'1½"	46 kg
5	Rekha	20 yrs	Primi	lower	veg	CS	F. baby 1.8 kg	4'11"	50 kg
6	Kusum	25 yrs	G2P2L2	lower	veg	premature vaginal del.	F. baby 2.2 kg	5'2"	52 kg
7	Kaush- alia	26 yrs	G4P3L3	middle	veg	vaginal del.	M. baby 2.2 kg	5'1"	48 kg
8	Nafisa	26 yrs	G3P2L2	lower	N.veg	vaginal del.	F. baby 2.35 kg	5'0"	46 kg
9	Sushma	25 yrs	G1P1L0	middle	veg	premature vaginal del.	M. baby 2.0 kg	4'11"	48 kg
10	Pista	22 yrs	G3P2L2	lower	veg	CS	M. baby 1.8 kg	5'0"	50 kg

**PRE ECLAMPSIA GROUP "A"****STC**

Name	II trimester	III trimester	IP Period	24 hrs PP	7th day PP	30th day PP
Manorama	-	171	180	160	156	-
Mamta Jain	160	168	184	160	150	140
Parvati	-	210	210	200	190	-
Rupali Rai	180	-	208	180	170	-
Sangeeta	-	256	270	240	230	210
Sangeeta Jain	170	186	200	190	-	-
Guddi	-	184	190	160	156	150
Sudha	166	176	190	164	156	-
Kiran	-	180	190	168	160	-
Bimla	214	230	236	210	200	190

**STG**

Name	II trimester	III trimester	IP Period	24 hrs PP	7th day PP	30th day PP
Manorama	112	114	105	102	-	-
Mamta Jain	76	80	84	81	76	70
Parvati	-	110	120	100	96	-
Rupali Rai	90	-	84	80	-	-
Sangeeta	-	144	150	134	130	110
Sangeeta Jain	110	116	120	-	-	-
Guddi	-	86	90	80	72	70
Sudha	90	96	90	82	-	-
Kiran	-	88	85	78	-	-
Bimla	116	128	128	120	112	108



**PRE ECLAMPSIA GROUP "A"****HDL**

Name	II trimester	III trimester	IP Period	24 hrs PP	7th day PP	30th day PP
Manorama	-	37	34	36	36	-
Mamta Jain	30	28	26	30	32	30
Parvati	-	40	38	38	36	-
Rupali Rai	36	-	32	38	34	-
Sangeeta	-	42	40	44	40	37
Sangeeta Jain	34	33	31	30	-	-
Guddi	-	33	31	33	36	34
Sudha	32	28	28	32	34	-
Kiran	-	34	34	36	34	-
Bimla	42	38	36	38	40	37

**LDL**

Name	II trimester	III trimester	IP Period	24 hrs PP	7th day PP	30th day PP
Manorama	-	114.6	123.2	103	99.6	-
Mamta Jain	114.8	124	139.2	113.8	102	96
Parvati	-	148	168	146	134.8	-
Rupali Rai	126	-	156	127.2	120	-
Sangeeta	183.2	200	165.2	165.2	165.2	146
Sangeeta Jain	114	132.8	143.2	136	-	-
Guddi	-	131.8	141	111	104.6	96
Sudha	116	128.8	140	114	105.6	-
Kiran	-	128.4	136.8	115	110.4	-
Bimla	148.8	169	172.4	148	137.6	126.4

**ECLAMPSIA GROUP "B"****STC**

Name of pts	II trimester	III trimester	IP period	24 hrs PP	7th Day PP	30th Day PP
Rajani	-	222	230	210	200	-
Guddi	-	210	270	230	220	-
Meena	-	170	190	180	-	-
Hemwati	-	278	300	290	270	-
Kashi bai	-	250	266	221	230	-
Gomti	-	192	200	-	180	170
Mala	-	-	187	170	165	160
Geeta	-	200	210	170	160	-
Raj Kumari	-	176	190	170	160	155
Susheela	-	192	202	190	186	-
Madhu	-	314	334	246	230	210
Pawan Kumari	-	210	230	214	200	-
Raj Kumari	-	215	230	215	205	-
Kunwar bai	-	228	240	198	186	-
Angoori	-	229	246	220	204	200
Jareena	-	214	230	210	200	-
Premwati	-	222	230	210	200	190

**STG**

Name of pts	II trimester	III trimester	IP period	24 hrs PP	7th Day PP	30th Day PP
Rajani	-	110	120	106	90	-
Guddi	-	130	150	110	110	-
Meena	-	90	88	80	-	-
Hemwati	-	150	160	150	140	-
Kashi bai	-	125	130	116	110	-
Gomti	-	91	84	-	80	78
Mala	-	-	70	65	60	60
Geeta	-	100	101	90	86	-
Raj Kumari	-	86	90	80	76	155
Susheela	-	109	110	100	92	-
Madhu	-	160	170	192	130	110
Pawan Kumari	-	100	110	105	100	-
Raj Kumari	-	101	110	101	96	-
Kunwar bai	-	111	120	94	90	-
Angoori	-	106	112	100	98	98
Jareena	-	100	104	100	96	-
Premwati	-	116	120	115	112	105

**ECLAMPSIA GROUP "B"****HDL**

Name of pts	II trimester	III trimester	IP period	24 hrs PP	7th Day PP	30th Day PP
Rajani	-	32	26	30	32	-
Guddi	-	27	22	24	22	-
Meena	-	27	24	27	-	-
Hemwati	-	37	32	32	28	-
Kashi bai	-	37	33	35	32	-
Gomti	-	36	32	-	34	32
Mala	-	-	24	22	22	22
Geeta	-	32	26	30	36	-
Raj Kumari	-	28	22	30	32	30
Susheela	-	37	32	34	32	-
Madhu	-	38	34	32	34	32
Pawan Kumari	-	34	32	32	30	-
Raj Kumari	-	34	30	34	30	-
Kunwar bai	-	32	28	32	34	-
Angoori	-	34	28	28	32	30
Jareena	-	33	30	32	30	-
Premwati	-	32	26	32	32	32

**LDL**

Name of pts	II trimester	III trimester	IP period	24 hrs PP	7th Day PP	30th Day PP
Rajani	-	168	178	159.8	150	-
Guddi	-	157	218	184	176	-
Meena	-	125	148.4	137	-	-
Hemwati	-	211	236	228	210	-
Kashi bai	-	188	203	162.8	176	-
Gomti	-	150.8	151.2	-	130	122.4
Mala	-	-	149	133	124	126
Geeta	-	148	161.2	122	107.8	-
Raj Kumari	-	131.8	150	124	110.8	109
Susheela	-	138.2	148	136	131.6	-
Madhu	-	244	266	185.5	166	152
Pawan Kumari	-	158	176	159	150	-
Raj Kumari	-	160.2	178	160.2	155.8	-
Kunwar bai	-	173.2	15	147.2	134	-
Angoori	-	173.8	195.6	170	152.4	148
Jareena	-	161	179	158	150.8	-
Premwati	-	164.8	178	153	142.6	129

**IUGR GROUP "C"****STC**

Name	II trimester	III trimester	IP Period	24hrs PP	7th day PP	30th day PP
Sunita	167	168.4	174	172	170	175
Sunita	179	184	190	182	180	-
Uma Verma	170	172	175	172	170	172
Geeta Tewari	-	162	168	160	156	150
Rekha	174	177	181	178.2	175	180
Kusum	168	174	179	162	156	-
Kaushailya	178	185	192	190	183	180
Nafisa	158	163	170	162	156	-
Sushma	166	172	179	176	170	-
Pista	156	158	161	159	156	150

**STG**

Name	II trimester	III trimester	IP Period	24hrs PP	7th day PP	30th day PP
Sunita	85	92	98	95	95	96
Sunita	86	90	92	90	86	-
Uma Verma	88	96	100	94	92	90
Geeta Tewari	-	84	90	86	83	80
Rekha	90	97	102	96	92	90
Kusum	90	96	100	94	92	-
Kaushailya	98	104	110	106	102	100
Nafisa	82	88	92	90	89	-
Sushma	80	86	90	82	80	-
Pista	92	97	98	94	92	90